THEMIS

Installation Manual

RES-21XR3

For X8STi/X8STi-F/X8STi-LN4/X8STi-3F

2RU 19”x17” Rack-Mount Rugged Enterprise Server
with X8STi/-F/-LN4/-3F Motherboard Configurations/
One Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon® CPU

RES-21XR3 for X8STi/-F/-LN4/-3F

One Quad/Dual-Core Xeon 5500 or Quad/Six-Core Xeon 5600 CPU

RES-21XR3 for X8STi/-F/-LN4/-3F

One Quad/Dual-Core Xeon 5500 or Quad/Six-Core Xeon 5600 CPU

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RES-21XR3 for X8STi/-F/-LN4/-3F

One Quad/Dual-Core Xeon 5500 or Quad/Six-Core Xeon 5600 CPU

*RES-21XR3 Installation Manual**

Version 1.0—January 2012

* SuperMicro Motherboards X8STi, X8STi-F, X8STi-LN4, X8STi-3F

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CE

This product complies with the European EMC Directive (2004/108/EC) and the European Low Voltage Safety Directive (2006/95/EC)/.

Safety Precautions

Instructions regarding safety precautions during installation, operation, or maintenance of the equipment are given in the section entitled “Safety Instructions” on page iv.

WARNINGS and CAUTIONS

The definitions of WARNINGS and CAUTIONS as used in this document are given in the Preface in the section entitled “Notes, Cautions, Warnings, and Sidebars”.

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Safety Instructions

To maximize user safety and ensure correct device operation, all instructions contained in this section should be read carefully.

Caution: It is important that the user observe all warnings and instructions that are on the device and contained in this manual.

- The device must be used in accordance with the instructions for use.
- Electrical installations in the room must correspond to the requirements of respective regulations.
- Take care that there are no cables, particularly mains cables, in areas where persons can trip over them.
- Do not use a mains connection in sockets shared by a number of other power consumers. Do not use an extension cable.
- Only use the mains cable supplied.
- The unit is completely disconnected from the power source only when the power cord is disconnected from the power source. Therefore the power cord and its connectors must always remain easily accessible.
- Do not set up the device in the proximity of heat sources or in a damp location. Make sure the device has adequate ventilation.
- All connection cables must be screwed or locked to the chassis housing.
- The device is designed to be used in horizontal position only.
- The device is no longer safe to operate when
  - — the device has visible damage or
  - — the device no longer functions.
- In these cases, the device must be shut down and secured against unintentional operation.
- Repairs may only be carried out by a person authorized by Themis Computer.
- The device may only be opened for the installation and removal of extension (PCI) cards, memory modules, storage drives, fan housings, power supplies,

and the lithium battery—all in accordance with the instructions given in this manual.

- If extensions are made to the device, the legal stipulations and the device specifications must be observed.
- The device must be switched off when removing the top cover; for example, before installing extension (PCI) cards.

Operation of Laser Source Devices

DVD/CD-ROM drives contain laser light-emitting diodes (classified in accordance with IEC 825-1:1993: LASER CLASS 1) and, therefore, must not be opened.

If the enclosure of such a drive is opened, invisible laser radiation is emitted. Do not allow yourself to be exposed to this radiation.

The laser system meets the code of Federal Regulations 21 CFR,1040 for the USA and Canadian Radiation Emitting Devices Act, REDR C 1370.

Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in static-safe containers such as boxes or bags.
2. Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
3. Always be properly grounded when touching a sensitive board, component, or assembly.
4. Store electrostatic-sensitive boards in protective packaging or on conductive foam.

Grounding Methods

Guard against electrostatic damage at workstations by following these steps:

1. Cover workstations with approved anti-static material. Provide a wrist strap connected to a work surface and properly grounded tools and equipment.

2. Use anti-static mats, heel straps, or air ionizers to give added protection.
3. Handle electrostatic-sensitive components, boards, and assemblies by the case or the PCB edge.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or test equipment.
6. Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use field service tools, such as cutters, screwdrivers, and vacuums that are conductive.
8. Always place drives and boards PCB-assembly-side down on the foam.

Instructions for the Lithium Battery

Systems are equipped with a lithium battery installed on the motherboard. To replace this battery, please observe the instructions that are described in this manual.

Warning: There is a danger of explosion when the wrong type of battery is used as a replacement.

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Preface

This document, entitled RES-21XR3 *Installation Manual*, provides instructions on how to install, configure, power up, and boot the Themis Rugged Enterprise Server RES-21XR3 (see *Figure 1* below), based on a single Intel Xeon™ Quad/Dual-Core 5500 or Quad/Six-Core 5600 CPU in an LGA1366 socket.

The RES-21XR3 supports one of four motherboards in a 17”-deep chassis:

- SuperMicro **X8STi, X8STi-F, X8STi-LN4,** and **X8STi-3F**

(a matrix describing 20”-deep chassis manuals is given in *Table 1*, page xviii. A matrix describing 17”-deep chassis manuals is given in *Table 2*, page xix.)

Figure 1. Rugged Enterprise Server Model RES-21XR3

Table 1. RES-*x*2XR3 20”-Deep Chassis Manual Matrix (AC and DC Power Supplies)

Category	Motherboard[a]	CPU Sockets	RES-32XR3 Manual Part Number	RES-22XR3 Manual Part Number	RES-22XR3 with Riser Manual Part Number	RES-12XR3 Manual Part Number
Configuration 1	X8DTH-iF X8DTH-6F	**2**	**116790-024**	**1176789-024**		
Configuration 2	X8DTi X8DTi-F X8DTi-LN4F	**2**	**117022-024**	**117017-024**		
Configuration 3	X8DT3 X8DT3-F X8DT3-LN4F	**2**	**117023-024**	**117018-024**		
Configuration 4	X8DTN+	**2**	**117024-024**	**117019-024**		
Configuration 5	X8DAi X8DA3	**2**	**117025-024**	**117020-024**		
Configuration 6*	X8DAH+-F	**2**	**117026-024**	**117021-024**		
Configuration 7	X8DTU-F				**117280-024**	**116970-024**

Naming Key: X8D*vwxyz*

- System RES-*x*2XR3, where *x* = 3, 2, or 1

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip
* Configuration 6 motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a “T” in the title.

w: H = Two Tylersberg Northbridge chips
blank = One Tylersberg Northbridge chip
U = Motherboard with cutout

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

a—All motherboards measure 12”W x 13”L except X8DTN+ and X8DAH+-F, which are 13.68”W x 13” L.

Table 2. RES-*x*2XR3S / RES-*x*1XR3 17”-Deep[a] Chassis Manual Matrix (AC and DC Power Supplies)

Motherboard	CPU Sockets	RES-32XR3S Manual P/N	RES-22XR3S Manual P/N	RES-12XR3S Manual P/N	RES-31XR3 Manual P/N	RES-21XR3 Manual P/N	RES-11XR3 Manual P/N
X8DTL-6F X8DTL-6	**2**	**117408-024**	**117412-024**	**117416-024**			
X8DTL-3F/-iF X8DTL-3/-i	**2**	**117409-024**	**117413-024**	**117417-024**			
X8DAL-3 X8DAL-i	**2**	**117411-024**	**117415-024**	**117419-024**			
X8SAX	**1**				**117420-024**	**117421-024**	
X8ST3-F X8STE	**1**				**117385-024**	**117422-024**	
X8STi X8STi-F X8STi-LN4 X8STi-3F	**1**					**118188-024**	**117423-024**

Naming Key: X8*uvwxyz*

- System RES-*x*2XR3S and RES-*x*1XR3, where *x* = 3, 2, or 1

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

a—The 17”-deep RES XR3 chassis actually measures 17.07” deep, but for simplicity will continue to be referred to as being 17” deep throughout these manuals.

A matrix describing RES chassis that are configured for front-I/O connector and front-PCI card access in a 16”-deep chassis is given in *Table 3*. This chassis design makes it more convenient to install cables to the system and demands no access to the rear of the chassis except to replace a fan. *Figure 2* shows the front view of a standard rear-I/O RES-22 chassis (*Figure 3* on page xxi shows the rear view); *Figure 4* on page xxi shows the front view of a front-I/O RES-22 chassis (*Figure 5* on page xxi shows the rear view).

Table 3. Front I/O 16”-Deep Chassis Manual Matrix (AC and DC Power Supplies)

Mother-board	CPU Sockets	RES-32XR3/FIO Manual P/N	RES-22XR3/FIO Manual P/N
X8DAH+-F*****	**2**	**117611-024**	
X8DTU-F	**2**		**117664-024**

Naming Key: X8*uvwxyz* ● System RES-*x*2XR3S and RES-*x*1XR3, where *x* = 3, 2, or 1

*RES-32XR3/FIO motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a “T” in the title.

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

Figure 2. Front View of a Standard Rear-I/O RES-22 Chassis (Doors Removed)

Figure 3. Rear View of a Standard Rear-I/O RES-22 Chassis

Figure 4. Front View of a Front-I/O RES-22 Chassis

Figure 5. Rear View of a Front-I/O RES-22 Chassis

The 2RU-high (3.50”) RES-21XR3 has been designed to fit into a standard 19” rack and is provided with rack-mount brackets with handles. *Optional* rack-mount slides are also available. The RES-21XR3 is rugged enough to withstand extreme shock (up to 35G), temperature, and EMI associated with such demanding markets as the military, aerospace, and telecommunications industries.

The single Quad/Dual-Core 5500 or Quad/Six-Core 5600 Series Intel Xeon CPU operates up to 6.4 GT/s (with a 1333-MHz front-side system bus) and supports up to 24 GB of DDR3 ECC DIMM memory modules. The RES-21XR3 is based on the functionality and capability of the following Intel chipset:

- Intel X58 Express chipset
- ICH1OR

An overview of RES-21XR3 design and specifications is given in Chapter 1, "Overview and Specifications", of this manual.

This manual is intended for an experienced system administrator with a knowledge of both networking and high-speed server systems.

Website Information

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Notes, Cautions, Warnings, and Sidebars

The following icons and formatted text are included in this document for the reasons described:

Note: A note provides additional information concerning the procedure or action being described.

Caution: A caution describes a procedure or action that may result in damage to the equipment. This may involve—but is not restricted to—heavy equipment or sharp objects. To reduce the risk, follow the instructions accompanying this symbol.

Warning: A warning describes a procedure or action that may cause injury or death to the operator as a result of hazardous voltages. To reduce the risk, follow the instructions accompanying this symbol.

Sidebar: A “sidebar” adds detail to the section within which it is placed, but is not absolutely vital to the description or procedure of the section.

General Section

Chapter 1

Overview and Specifications

1.1 Overview

The **RES-21XR3** (see *Figure 1-1* below; a block diagram is given in *Table 1-3*, page 1-4). Is a rack-mounted high-performance system designed specifically for above-average shock and vibration environments. The RES-21XR3 supports one Intel® 1366-pin LGA 64-bit 5500/5600-Series Xeon™ processor, with a QPI (Quick-Path Interconnect) up to 6.4GT/s (Giga-Transfers per Second) supporting 24 GB of 1333/1066/800-MHz DDR3 ECC Registered memory modules. Its computer/graphics-intensive and diverse-I/O capabilities are ideal for military/aerospace and commercial telecommunications applications. Motherboard options supported by the RES-21XR3 are listed in *Table 1-1*, page 1-2.

Figure 1-1. RES-21XR3 (with Front Doors installed)

Table 1-1. RES-21XR3 Motherboard Options

Mother-board[a]	IPMI	SATA	SAS	Memory Slots[b]	Graphics	Audio	PCI-e and PCI Slots[c]		
							PCI-e 2.0 x16	PCI-e x8[d]	PCI[e]
X8STi	No	Yes	No	6	Yes	—	1	1	1
X8STi-F	Yes	Yes	No	6	Yes	—	1	1	1
X8STi-LN4	No	Yes	No	6	Yes	—	1	1	1
X8STi-3F	Yes	Yes	Yes	6	Yes	—	1	1	1

a—SuperMicro Computer, Inc.

b—Max DIMM size per slot is 4 GB.

c—please refer to “PCI Cards”, page 2-7 for PCI/-E usage and restrictions.

d—SXB:PCI-E x8

e—Due to the physical constraints of the system configuration, the PCI Slot is not used.

Table 1-2. Differences Between Main Features of the X8STi motherboards

Feature	X8STi	X8STi-F	X8STi-3F	X8STi-LN4
LAN3/LAN4	No	No	No	Yes
NIC3(LAN3)_LED/ NIC4(LAN4)_LED	No	No	No	Yes
JPL3/JPL4 (LAN3/4 Enable)	No	No	No	Yes
IPMI 2.0 Support/IPMI Jumper (JBMC1)	No	Yes	Yes	No
IPMI Dedicated LAN	No	Yes	Yes	No
I-Button	No	No	Yes	No
SAS Ports 0~7	No	No	Yes	No
3-GPIO1/2 (Serial Link IO)	No	No	Yes	No
SAS LEDs (LES1/LES2)	No	No	Yes	No

The RES-21XR3 is designed within a 2RU-high (3.50”) form-factor, 17” (43.2 cm) deep and 17” (43.4 cm) wide, (which, with mounting brackets, fits a 19”-wide rack; see). Major features of the RES-21XR3 are described in *Table 1-3*, page 1-5.

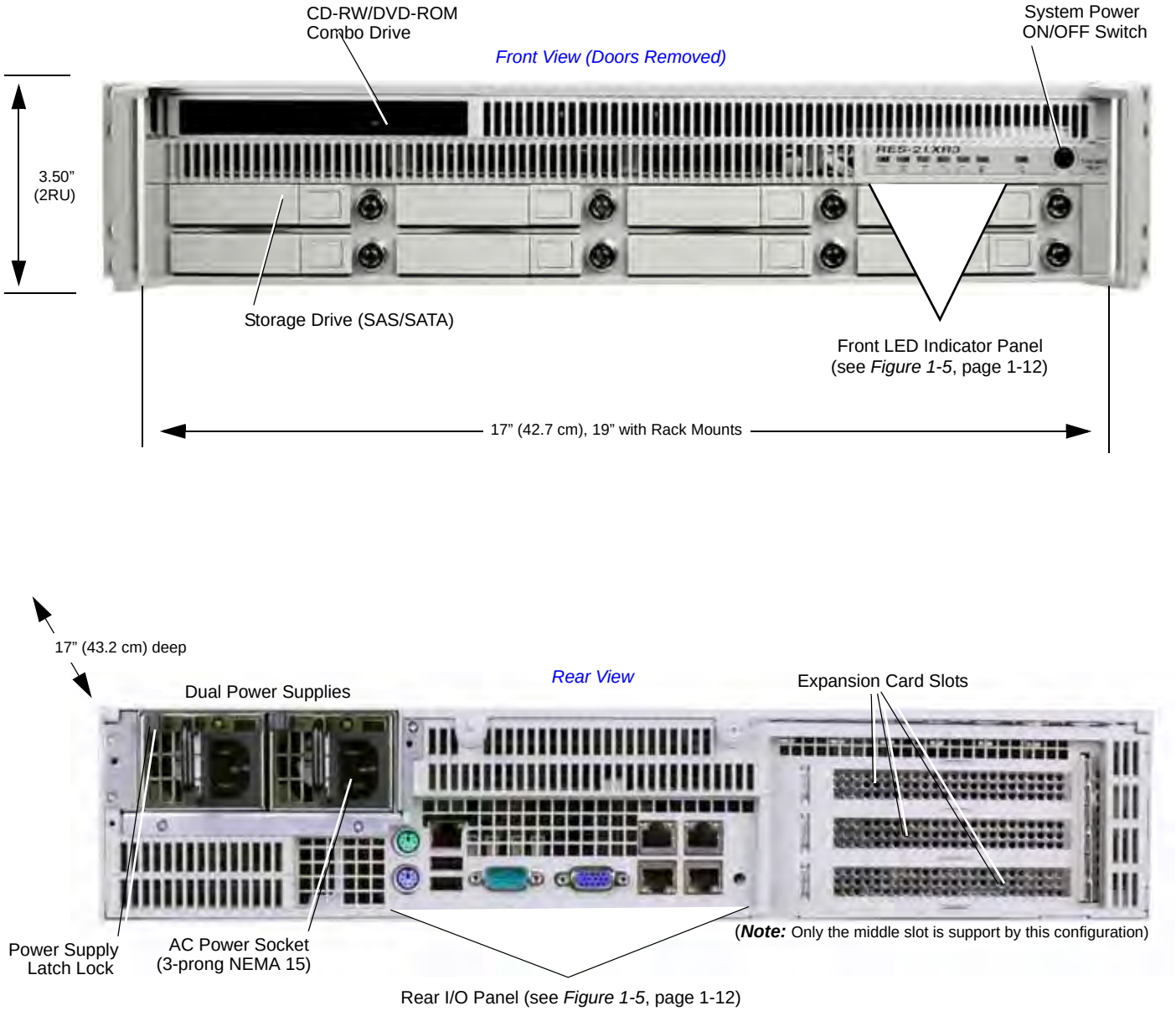


Figure 1-2. External Features of the RES-21XR3

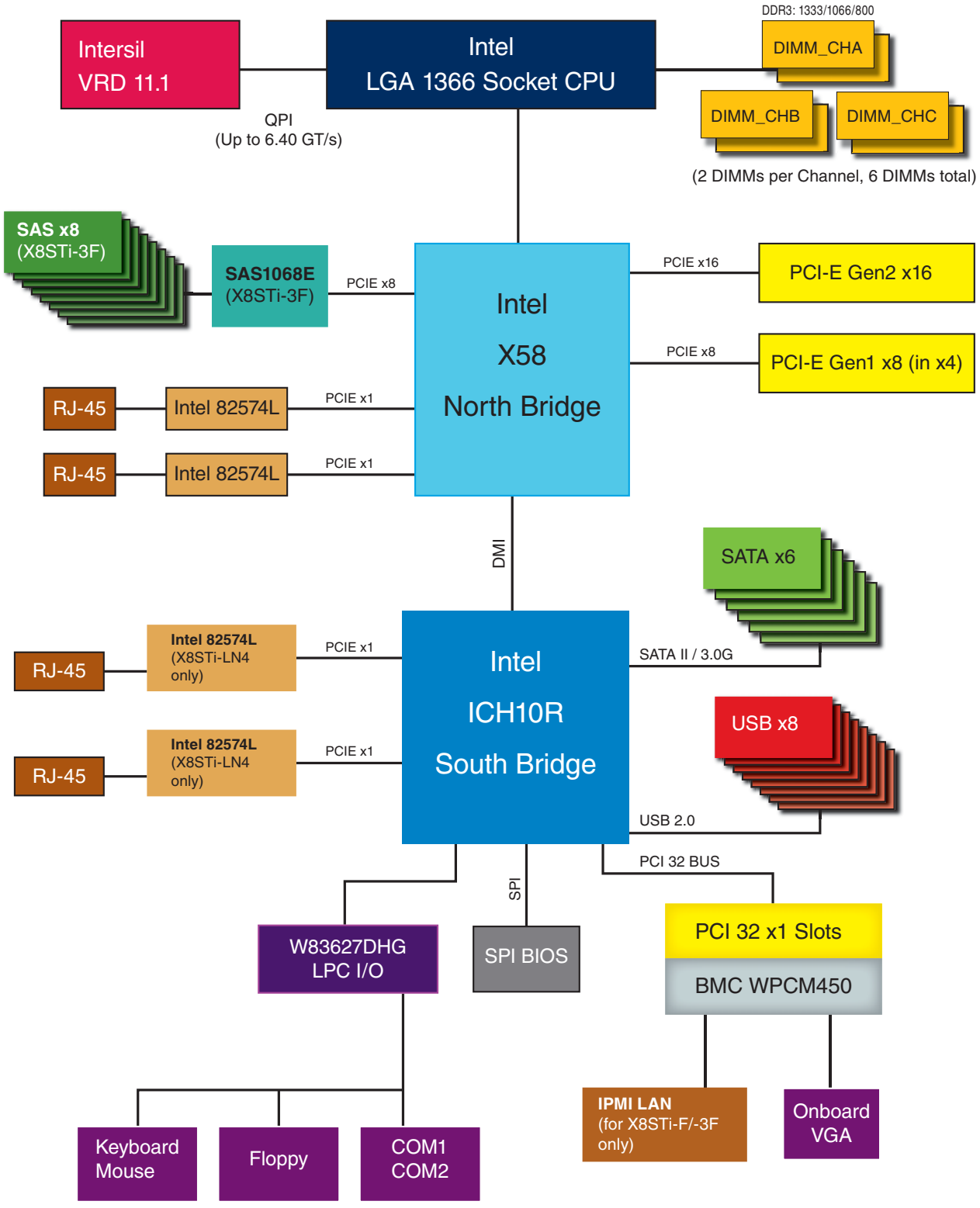


Figure 1-3. X8STi series Motherboard Block Diagram

The RES-21XR3 is designed within a 2RU-high (3.50”) form-factor 17” (43.2 cm) deep and 17” (43.4 cm) wide (which, with mounting brackets, fits a 19”-wide rack). Major features are listed in *Table 1-3* below.

Table 1-3. Major Features of RES-21XR3

Feature	Details
Processor (CPU)	• One Quad-Core/Dual-Core Intel® 5500 Series or Quad/Six-Core 5600 Series Xeon Processor with QPI (QuickPath Interconnect) links up to a 51.2 GT/s data-transfer rate (6.4 GT/s per direction)
Chipset	• Intel® X58 Express chipset • ICH10R
Memory	• Up to 24 GB of 1333 / 1066 / 800-MHz ECC Registered / ECC Unbuffered DDR3 72-bit SDRAM • Six 240-pin gold-plated DIMM sockets
Expansion slots	• See *Table 1-1* on page 1-2 for details
Peripheral Support	• Eight SAS, or five SATA II storage drives directly from the motherboard with one SATA header being consumed by the CD/DVD drive; additional SATA support[a] is provided by an optional PCI-card installation. • 1 combination CD-RW/DVD-ROM (IDE) drive
Rear-Panel I/O	• See *Table 1-6* on page 1-14 for details
Operating temperature[b]	• 0° up to 65° C (32° up to 149°F)
Shock endurance[a]	• 35G @ 25-msec duration (3 axis)
Dimensions	• 3.50” (2RU) high, 17” (43.4 cm) wide (19”/48.3 cm with mounting brackets), 17” (43.2 cm) deep
Rack-mount brackets and slides	• Left and right rack-mount tabs are attached to the chassis • Left and right rack-mount slides are *optional*
Dual power supplies	• 750 watts each, auto-ranging (100–265 Vac) • Load-sharing N+1 redundant, hot-pluggable • O*ptional*—Choice of 750-watt (48V) or 500-watt (28V) DC Power supply

a—Chassis supports a total of 8 storage drives.

b—Specifications are dependent on the configurations specified in this manual.

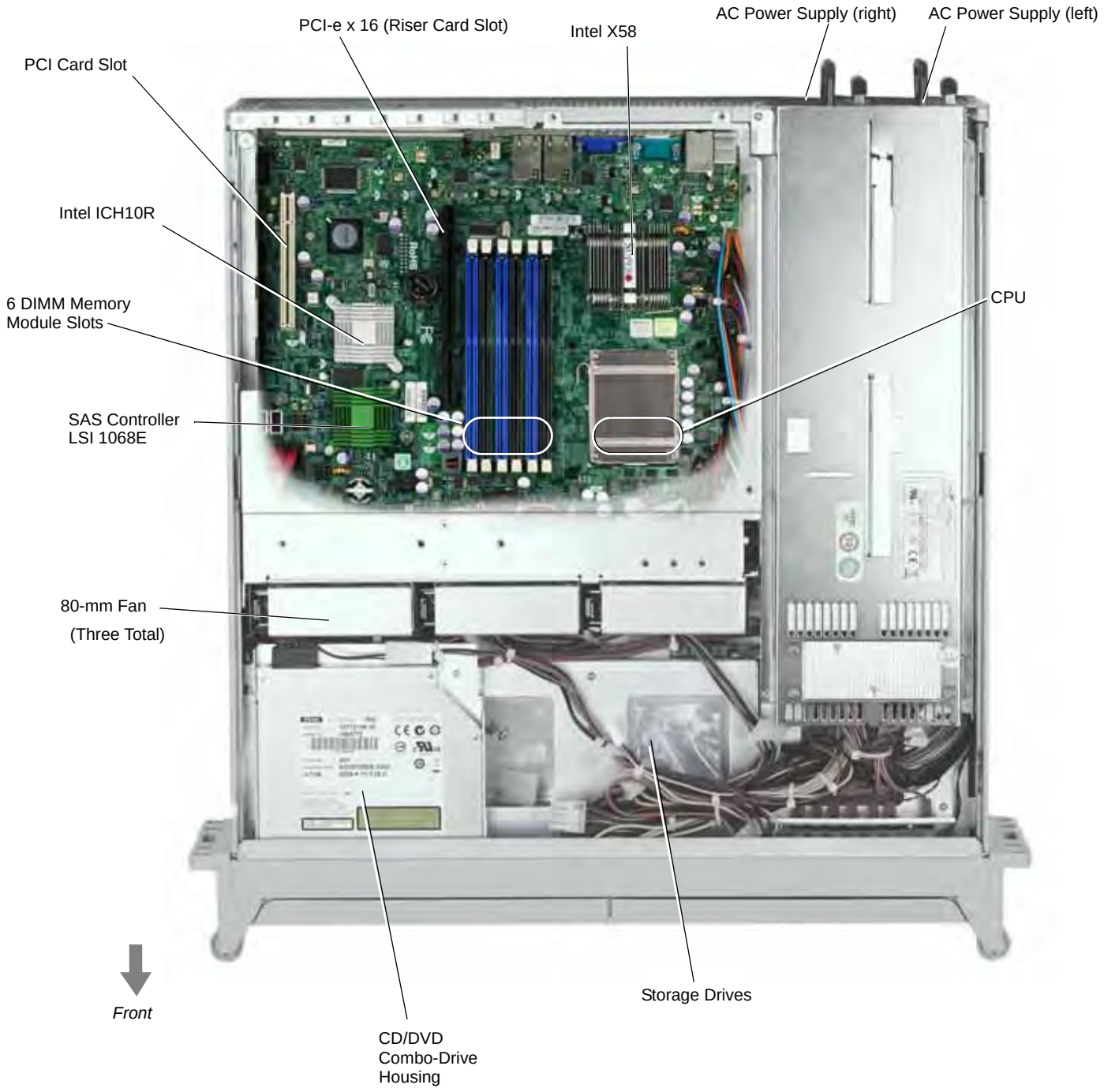


Figure 1-4. Open Top View of the RES-21XR3

1.2 Chipset Overview

Built upon the functionality and the capability of the Intel X58 Express chipset, the X8STi/X8STi-F/X8STi-3F/X8STi-LN4 motherboard provides the performance and feature set required for single-processor-based high-end systems with configuration options optimized for intensive application and high-end server platforms.

The X8STi/X8STi-F/X8STi-3F/X8STi-LN4 supports the Intel® Xeon® 5500/5600 series processors, the Intel X58 Express chipset, and the ICH10R. With Intel QuickPath Interconnect (QPI) technology built in, the X8STi/ X8STi-F/X8STi-3F/X8STi-LN4 offer point-to-point system interconnect interface, replacing the current Front Side Bus technology, providing substantial system performance enhancement by utilizing serial link interconnections to increase bandwidth and scalability.

1.2.1 Features of the LGA 1366 Processor and the X58 Chipset

- Intel QuickPath Interconnect link, up to 6.4 GT/s of data transfer rate in each direction.
- Virtualization Technology, Integrated Management Engine support
- Point-to-point cache coherent interconnect, Fast/narrow unidirectional links, and Concurrent bi-directional traffic
- Error detection via CRC and Error correction via Link level retry

1.3 PC Health Monitoring

This section describes the PC health monitoring features of the X8STi/X8STi-F/ X8STi-3F/X8STi-LN4 motherboards. These features are supported by an onboard System Hardware Monitor chip.

1.3.1 Recovery from AC Power Loss

BIOS provides a setting for you to determine how the system will respond when AC power is lost and then restored to the system. You can choose for the system to remain powered off (in which case you must hit the power switch to turn it back on), or for it to return to a power on state. See the Power Loss Control setting in the BIOS chapter of this manual to change this setting. The default setting is **Last State**.

1.3.2 Onboard Voltage Monitoring

The onboard voltage monitor will scan the following voltages continuously: CPU Core, Chipset Voltage, Memory Voltage, +1.8V, +3.3V, +3.3V standby, +5V, +5V Standby, Vbat and ±12V. Once a voltage becomes unstable, it can give a warning by email notification alert, or send an error message to the screen. Users can adjust the voltage thresholds to define the sensitivity of the voltage monitor by using SDIII (SuperDoctor III). Please refer to http://www.supermicro.com/PRODUCT/Manuals/SDIII/UserGuide.pdf for more information regarding system monitoring with SDIII.

Note: All Supermicro products are designed to support hardware monitoring on preselected features. However, SuperDoctor III allows the user to select items to be monitored and to change both the high and low limits of these items on the configuration page.

1.3.3 Fan Status Monitor with Software

The RES-21XR3 has three 80-mm cooling fans and one within each power supply. PC Health Monitoring can check the RPM status of the cooling fans.

1.3.4 CPU Overheat LED and Control

This feature is available when the user enables the CPU overheat warning feature in the BIOS. This allows the user to define an overheat temperature. When this temperature reaches this pre-defined overheat threshold, the CPU thermal trip feature will be activated and it will send a signal to the buzzer and, at the same time, the CPU speed will be decreased.

Caution: To avoid possible system overheating, please be sure to provide adequate airflow to your system and that all chassis air vents are free of blockage and debris.

1.4 Power Configuration Settings

This section describes the features of your motherboard that deal with power and power settings.

1.4.1 Slow Blinking LED for Suspend-State Indicator

When the CPU enters a suspend state, the Power LED will start blinking to indicate that the CPU is in suspend mode. Pressing any key on the keyboard will awaken the CPU, at which time the power LED will stop blinking and remain on.

1.4.2 BIOS Support for USB Keyboard

If the USB keyboard is the only keyboard in the system, it will function like a normal keyboard during system boot-up.

1.4.3 Main Switch Override Mechanism

When an ATX power supply is used, the power button can function as a system suspend button. When the user presses the power button, the system will enter a SoftOff state. The monitor will be suspended and the hard drive will spin down. Pressing the power button again to wake-up the whole system. During the SoftOff state, the ATX power supply provides power the system to keep the required circuitry “alive”. In case the system malfunctions and you want to turn off the power, just press and hold the power button for 4 seconds. The power will turn off and no power will be provided to the motherboard.

1.4.4 Wake-On-LAN (WOL)

Wake-On-LAN is defined as the ability of a management application to remotely power up a computer that is powered off. Remote PC setup, up-dates and asset tracking can occur after hours and on weekends so that daily LAN traffic is kept to a minimum and users are not interrupted. The motherboard has a 3-pin header (WOL) to connect to the 3-pin header on a Network Interface Card (NIC) that has WOL capability. In addition, an onboard LAN controller can also support WOL without any connection to the WOL header. The 3-pin WOL header is to be used with a LAN add-on card only.

1.5 Super I/O

The disk drive adapter functions of the Super I/O chip include a floppy disk drive controller that is compatible with industry standard 82077/765, a data separator, write pre-compensation circuitry, decode logic, data rate selection, a clock generator, drive interface control logic and interrupt and DMA logic. The wide range of functions integrated onto the Super I/O greatly reduces the number of components required for interfacing with floppy disk drives. The Super I/O supports two 360 K, 720 K, 1.2 M, 1.44 M or 2.88 M disk drives and data transfer rates of 250 Kb/s, 500 Kb/s or 1 Mb/s.

It also provides two high-speed, 16550 compatible serial communication ports (UARTs). Each UART includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem control capability and a processor interrupt system. Both UARTs provide legacy speed with baud rate of up to 115.2 Kbps as well as an advanced speed with baud rates of 250 K, 500 K, or 1 Mb/s, which support higher speed modems.

The Super I/O provides functions that comply with ACPI (Advanced Configuration and Power Interface), which includes support of legacy and ACPI power management through a SMI or SCI function pin. It also features auto power management to reduce power consumption.

1.5.1 Winbond WPCM450 Controller (X8STi-F/-3F Only)

The Winbond WPCM450 Controller is a Baseboard management Controller (BMC) that supports the 2D/VGA-compatible Graphics Core with the PCI interface, Virtual media, and Keyboard/Video/Mouse Redirection (KVMR) modules.

The WPCM450 interfaces with the host system via a PCI interface to communicate with the Graphics core. It supports USB 2.0 and 1.1 for remote keyboard/mouse/virtual media emulation. It also provides LPC interface to control Super I/O functions. The WPCM450 is connected to the network via n external Ethernet PHY module.

The WPCM450 communicates with onboard components via six SMBus interfaces, fan control, and Platform Environment Control Interface (PECI) buses, and General Purpose I/O (3SGPIO) ports.The WPCM450 also includes the following features:

- One X-Bus parallel interface for expansion I/O connections
- Three ADC inputs, Analog and Digital Video outputs
- Two serial ports for boundary scan and debug

Note: For more information on IPMI configuration, please refer to the Embedded IPMI User's Guide posted on the SuperMicro website at http://www.supermicro.com/support/manuals/.

1.6 System LEDs and I/O Connectors

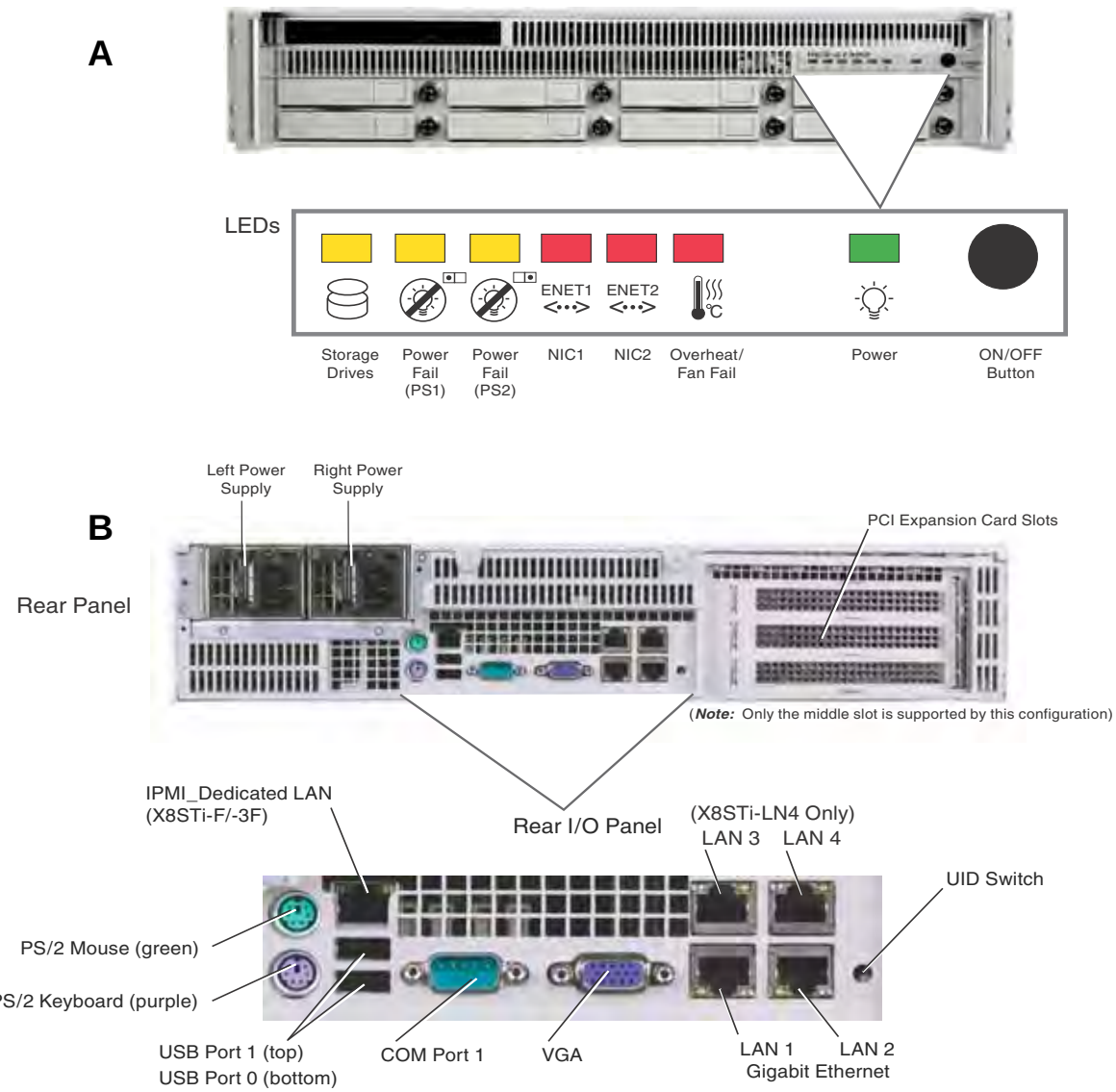


Figure 1-5. RES-21XR3 System LEDs and I/O Connectors

All RES-21XR3 system LEDs are located on the front panel (see **A**, *Figure 1-5*); all I/O connectors are located on the rear panel (see **B**, *Figure 1-5*). LEDs are described in *Table 1-5* on page 1-13; I/O connectors are described in *Table 1-6*, page 1-14

Table 1-4. Power Supply LED Behavior

Symbol	LED Power	System LED	Description
	On (red LED)	Power Fail LED (Left Power Supply) Note: system is powered on	• If system is powered on, warns that the left power supply has failed or has lost AC input.
	On (red LED)	Power Fail LED (Right Power Supply) Note: system is powered on	• If system is powered on, warns that the right power supply has failed or has lost AC input.
 And 	Off	Power Fail LED (Left & Right Power supply) Note: system is powered on	• System is powered on and power supply modules are functioning normally, or system has been shut down and there has been no interruption to the AC power.
 Or 	On (red LED)	Power Fail LED (Left or Right Power Supply)[a] Note: system is powered off	• AC power has been interrupted to both power supply modules. When power is restored but system is still off, one of the two indicator lights will be lit.
Rear Power Supply Modules	On (green LED)	Green LED (adjacent to AC input) Note: system is powered on	• System is receiving DC power (3.3V, 5V, 12V) from the power supply module
	Off[b]	Green LED (adjacent to AC input) Note: system is powered off	• System is off and not receiving DC power from the Power Supply module.

a—This LED behavior indicates only that AC power has interrupted to both power supplies, and does not indicate which power supply module lost power first, or regained power first.

b—This LED behavior indicates that DC power is not being used, and the system is off. It does not indicate a loss of AC power to the power supply module.

Table 1-5. System LEDs

Symbol	LED	Description
	Power	● Indicates that the system is turned on.
	Storage Drive	● Indicates storage-drive activity.
ENET1	NIC1[a] (Gb Ethernet)	● Indicates network activity on LAN 1.
ENET2	NIC2 (Gb Ethernet)	● Indicates network activity on LAN 2.
	Overheat/Fan Fail —Normally OFF —RED light when temperature limits are exceeded	● Warns that the system is exceeding specified temperature parameters. The CPU overheat warning function must be enabled in the BIOS, thus allowing the user to define an overheat temperature, which—when exceeded—triggers the overheat warning LED.
Symbol	**Rear Panel LED(s)**	**Description**
N/A	LAN1 and LAN2 LAN3[b] and LAN4[b]	Each Ethernet port contains two LEDs: ● The color of the left LED (when facing the port) indicates the LAN connection speed: - Off = 10 MHz - Green = 100 MHz - Amber = 1 GHz ● The right LED, when lit, indicates LAN activity.

a—NIC = Network Interface Controller.

b—LAN3 & 4 supported by extra gigabit Ethernet controller on the X8DTi-LN4F

Table 1-6. Rear-Panel I/O Connectors

Connector	Description
PS/2 Mouse	• 6-pin mini-DIN connector to attach a PS/2 mouse device.
PS/2 Keyboard	• 6-pin mini-DIN connector to attach a PS/2 keyboard device.
USB 0 and USB 1 Hi-Speed USB 2.0 Serial Ports	• Two 4-pin USB connectors to attach serial devices to USB port 0 and USB port 1. *Note:* Six additional USB ports (USB 2 through USB 7) can be accessed directly from the motherboard.
COM 1 Serial Port	• One DB9 (male) connector on rear panel to attach a serial device to COM 1port A second serial port (COM 2) can be accessed directly from the motherboard.
VGA Graphics Connector	• One 17-pin VGA connector to provide a video and CRT display
Ethernet LAN Ports	• Standard RJ45 connector to attach one or two gigabit Ethernet LAN line(s)—LAN 1 and LAN 2. **X8STi-LN4** has an extra gigabit Ethernet controller for two extra ports (LAN 3 and LAN 4).
IPMI Dedicated Ethernet LAN Port	• Standard RJ45 connector to attach a dedicated IPMI LAN line with full KVM support (X8STi-F and X8STi-3F only)
Unit Identifier (UID) Switch	• A Unit Identifier Switch and two LED indicators are located on the motherboard. When the UID switch is pressed, both LEDs are turned on (one LED is located at the rear edge of the motherboard, the other LED is at the front of the motherboard). Pressing the UID again turns off both LED indicators. The UID indicators provide an easy identification of a system unit that may be in need of service. *Note:* The UID can also be triggered via IPMI.

1.7 Specifications

1.7.1 General

Table 1-7 lists general specifications for the RES-21XR3.

Table 1-7. RES-21XR3 General Specifications

Parameter	Description
Dimensions	• 3.50” (2RU) high • 17” (43.4 cm) wide (19” rack-mountable) • 17” (43.2 cm) deep
Weight[a]	• Approximately 22.5 pounds (10.2 kg), includes 1 CPU, 6 DIMMs, 1 full-length (up to 12.25”) PCI card, 1 CD-RW/DVD-ROM drive, 2 storage drives, and 2 power supplies • Add 8.8 pounds (4 kg) for the shipping container and two AC power cords • The manual and associated shipping paperwork weighs approximately 1 lb (0.45 kg)
19” Rack-Mountable with Slide capability	• Left and right rack-mount tabs attached to chassis • Left and right rack-mount slides are *optional*
Temperature[b] Operating: Non-Operating:	 • 0° up to 65° C (32° up to 149°F) • –40° to 70° C (–40° to 158° F)
Relative Humidity[a] Operating: Non-Operating:	 • 8% to 95% (non-condensing) • 5% to 95% (non-condensing)
Maximum Wet Bulb[a] Operating: Non-Operating:	 • 163°C, non-condensing • 180°C, non-condensing
Altitude[a] Operating: Non-Operating	 • 0 to 10,000 feet above sea level • 0 to 40,000 feet above sea level

a—Exact weight is dependent on the specific type of hardware, and amount, installed in your syste.

b—Specifications are dependent on the configurations as specified in this manual.

1.7.2 Electrical

Table 1-8 lists the electrical specifications for the RES-21XR3.

Table 1-8. RES-21XR3 Electrical Specifications

Parameter	Description		
	AC (120 volts, 750W)	**DC (48 volts, 750W)**	**DC (28 volts, 500W)**
Input Power (*typical*)	• 370 watts (*typical*)[a]	• 370 watts (*typical*)[a]	• 450 watts (*typical*)
Input Current	• 3.5 amperes @120 Vac	• 13.5 amperes @48 Vdc	• 16 amperes @28 Vdc
Input Frequency	• 50/60 Hertz	*NA*[b]	*NA*[b]
Input Voltage	• 100–265 Vac, internally fused	• 40–72 Vdc, internally fused	• 18–36 Vdc, internally fused
Input VA Rating	• 425 VA	*NA*	*NA*
BTU Rating	• 1447 BTU/hour	• 1447 BTU/hour	• 1447 BTU/hour
Power Factor	• 0.99	*NA*	*NA*
Input Leakage Current	• 3.5 mA	*NA*	*NA*
Plug Type	• IEC	• Y-Type (SVS5-4 or equivalent)	• Y-Type (SVS5-4 or equivalent)

a—Tested using a SuperMicro X8DA3 Motherboard (32GB RAM) with a nVidia GeForce 9600 GT graphics card. Please contact Themis if exact electrical specifications are needed for a specific system configuration.

b—NA = Not Applicable.

1.7.2.1 System Power

The RES-21XR3 operates with two N+1 redundant power supplies of 750-watts capacity each that auto-range single-phase AC input from 100 to 265 Vac (47 to 63 Hertz) sources. Filtered and fused (internal) AC is supplied to each power supply from a rear-mounted power connection. Two *optional* N+1 redundant DC power supplies of 750 watts (48 volts) or 500 watts (28 volts) each may be substituted for the AC power supplies (see *Table 1-8*). These supplies should be specified at the time of your order.

Note: Some AC RES systems may be installed with **650-watt** instead of **750-watt** power supplies, which should not affect the performance of the system.

1.7.2.2 Output Voltage

The RES-21XR3 power supply provides output voltages that are split between +3.3V, +5V, +$5V_{sb}$, +12V, and -12V rails.

1.7.3 Environmental

1.7.3.1 Shock

The RES-21XR3 is designed to survive an elevated shock environment. All structural components are welded together, enabling the system to survive a maximum 3-axis shock load of 35G at 25-ms duration.

1.7.3.2 Electrostatic Discharge

The RES-21XR3 is designed to tolerate electrostatic pulses up to 15 kilovolts (KV) with no impact on system operation.

1.7.3.3 Noise

The RES-21XR3 conforms to the 54-db noise specification. It is possible to achieve further noise reduction by installing a sound baffle (muffler) on both the front and rear of the RES-21XR3 chassis (*Figure 1-6* and *Figure 1-7* on page 1-18 show the front and rear baffles, respectively, for a RES-21XR3 system). Contact your Themis representative for additional information.

Figure 1-6. RES-21XR3 with Front Sound Baffle Installed (Front View)

Front Access—Opening the two front doors of the RES-21XR3 requires removing the front sound baffle. To do this, loosen the two (2) captive knurled Phillips screws holding the baffle to the chassis (see **A**, *Figure 1-6*) and remove the baffle.

Note: All RES systems are shipped with BIOS fan speed set to the quietest mode. As such, the BIOS setting will read as"**Energy Saving/ES**".

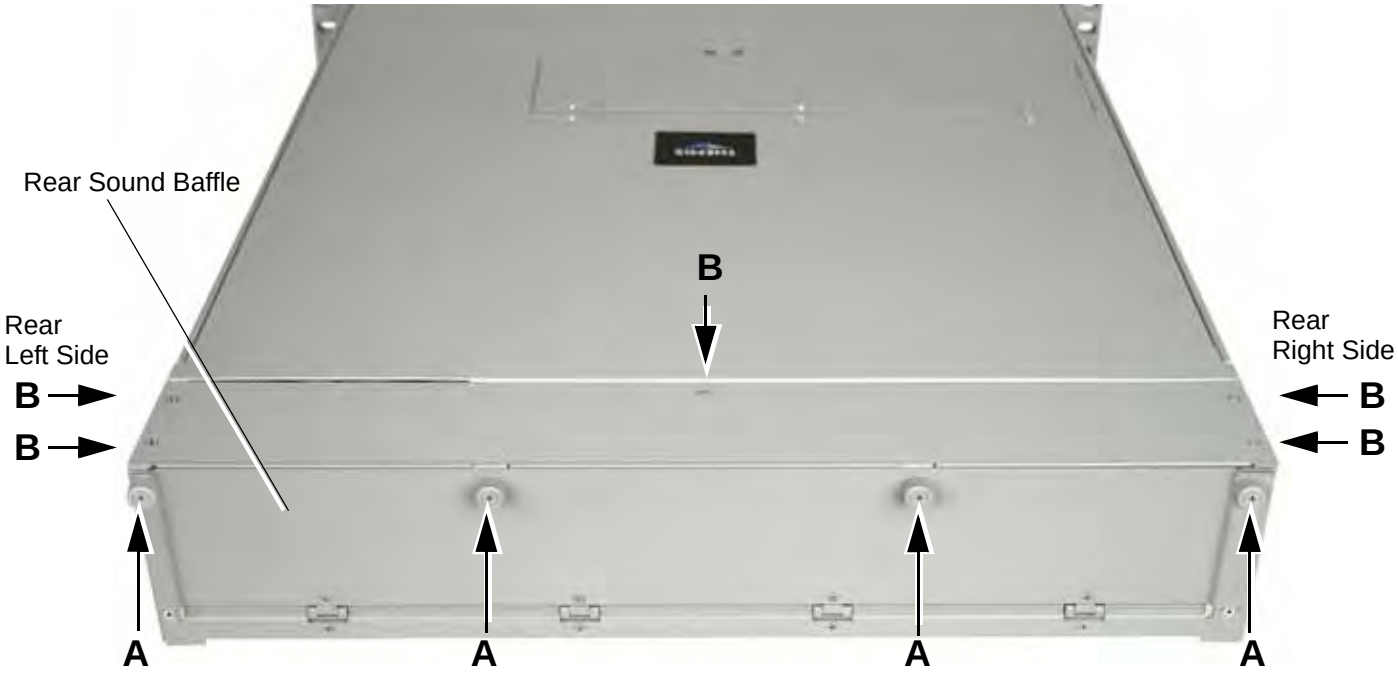


Figure 1-7. RES-21XR3 with Rear Sound Baffle Installed (Rear View)

Rear Access—Accessing the I/O connectors and PCI card I/O on the rear of the RES-21XR3 requires opening the rear sound baffle door. To do this, loosen the four (4) captive knurled Phillips screws **A** holding the baffle door to the chassis (see **A** in *Figure 1-7*) and swing the door downward away from the chassis, exposing the rear connectors and PCI cards.

Removing the protective top cover for access to the interior requires that the rear sound baffle be totally removed (this can be done with the baffle door closed). To do this, five (5) M3x4 flathead Phillips screws **B** must be removed, two on each side of the baffle and one (captive) in the middle on the top (see *Figure 1-7*).

After removing the rear baffle, the top cover can be removed as described in Section 2.1.1, "Remove Protective Top Cover," on page 2-1 (Chapter 2, "Installation and Operation").

1.8 Packaging and Shipping

The RES-21XR3 is packaged in a reusable shipping container. Approximate weight of an empty container and two AC power cords is 8.8 pounds (4 kg).

The approximate weight of a RES-21XR3 (loaded with 1 CPU, 6 DIMMs, 2 storage drives, 2 full-length PCI cards, 1 CD-RW/DVD-ROM drive, and two power supplies) is approximately 22.5 pounds (10.2 kg). [See *Table 1-7* on page 1-15 for a general weight table for all models of the RES Series.]

The approximate weight of a manual and associated shipping paperwork is one pound (0.45 kg).

Therefore, both the shipping container and a fully installed RES-21XR3 including power cords, manual, and associated paperwork, weigh approximately 32.3 pounds (14.65 kg).

Caution: **Do not discard the original packaging** in which your system was shipped.

The original packaging was designed specifically to withstand the stress and rigors of today's shipping environment. It will be needed in the event the system must be shipped back to Themis Computer. For re-packing instructions, refer to Appendix F, "Re-packaging for Shipment"

1.8.1 Accessory Kit

Each RES-21XR3 is packaged with an Accessory Kit, consisting of the following items:

A. Two AC Power Cords

B. Two Front-Bezel Barrel Keys

When you unpack the RES-21XR3, please verify that all of these items are included. If any of these items are missing or not as pictured, please call Themis Technical Support at 510-252-0870, or send an email to support@themis.com.

To learn how to secure the AC power cords and the power-cord retainer bracket, refer to Section 2.3.1, "Plugging in the AC Power Cords," on page 2-20.

1.8.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-21XR3 for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and can be ordered at the time of purchase. To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.

Table 1-9. Approximate Weights[a] of the RES Series

Model	Weight (Approximate)	CPU Sockets	Depth	Description
RES-12XR3	19.5 lbs (8.9 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards (one for 11XR3) ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-12XR3-S	17 labs (7.7 kg)	2	17”	
RES-11XR3	14.6 lbs (6.6 kg)	1	17”	
RES-22XR3	25 lbs (11.4 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-22XR3-S	23 lbs (10.4kg)	2	17”	
RES-22XR3/FIO	25.3 lbs (11.5kg)	2	16”	
RES-21XR3[b]	22.5 lbs (10.2 kg)	1	17”	
RES-32XR3	28.5 lbs (12.9 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-32XR3-S	26.5 lbs (12 kg)	2	17”	
RES-32XR3/FIO	29 lbs (13.2 kg)	2	16”	
RES-31XR3	26 lbs (11.8 kg)	1	17”	

a—Exact weight depends on the specific type, and amount, of hardware installed in your system.

b—This system configuration only allows for 1 full-length PCI card, and one CPU.

Installation Section

Chapter 2

Installation and Operation

This chapter describes:

- How to install a memory module, storage drive, PCI card, 80-mm-fan, power supply, and lithium battery
- Rack-mount brackets
- How to turn the RES-21XR3 on and off

2.1 Installation Procedures

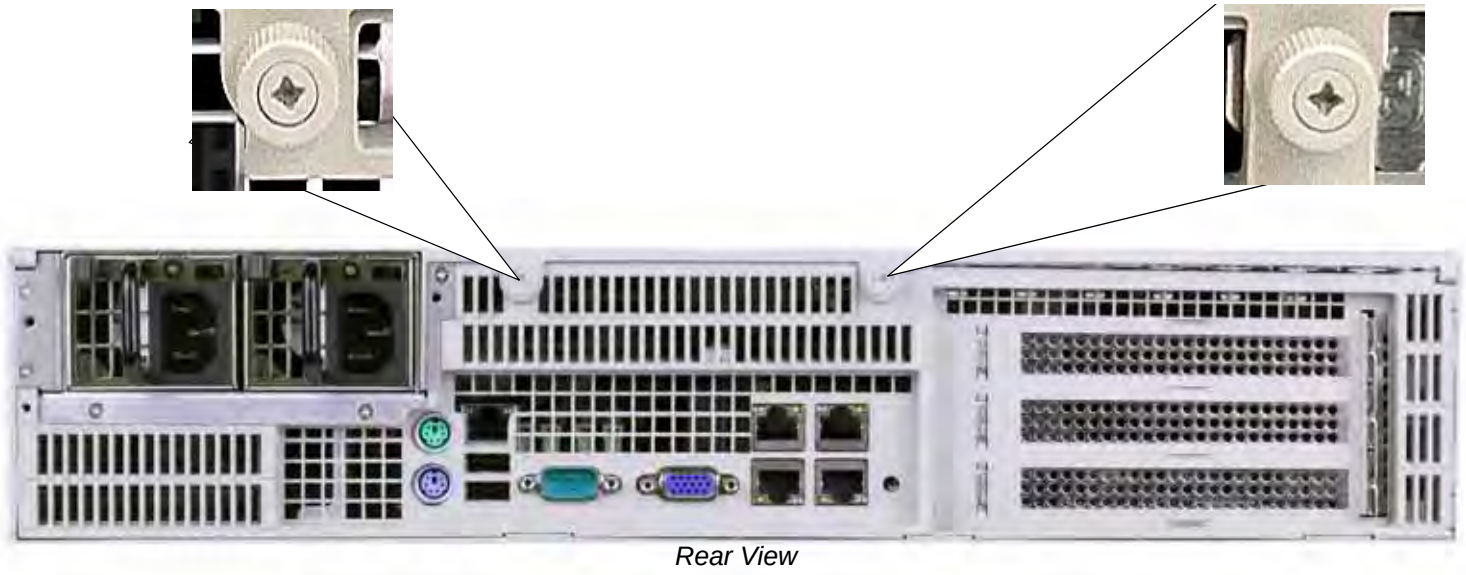
Caution: Use industry-standard ESD grounding techniques when handling all components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface. **Handle all IC cards by the front panel or edges only.**

To install or replace a SAS/SATA **storage drive**, **fan**, or **power supply**, skip the next section and proceed directly to page 2-12, page 2-15, or page 2-16, respectively. Replacement of motherboard components requires removal of the protective cover, and is some cases the air-flow deflector.

2.1.1 Remove Protective Top Cover

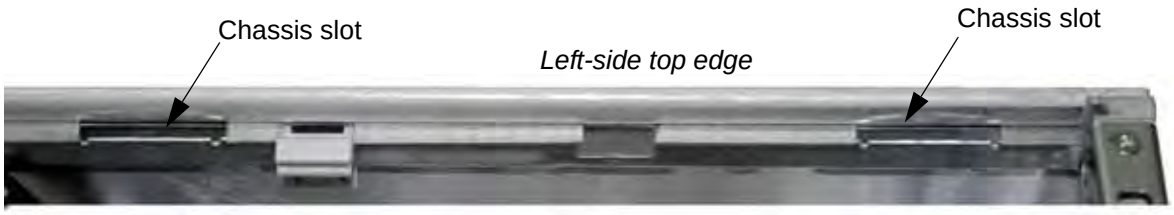
To access a motherboard component, open the RES-21XR3 as follows:

1. Loosen the two captive Phillips screws holding the protective top access cover to the rear of the RES-21XR3 chassis (see **A**, *Figure 2-1*).
2. Both the front and sides of the cover have flat hooks or tabs underneath that fit under slots on the chassis top edges (see **B**, *Figure 2-1*). Remove the cover by sliding it toward the rear until it is free of these chassis slots.
3. Store the cover in a safe location until it is replaced.
4. Proceed to the appropriate section to install or replace a **memory module** (page 2-3), **PCI card** (page 2-7), or **lithium battery** (page 2-11).



Rear View

A Loosen the 2 captive access-cover screws…



B …and slide the top cover toward the rear until the top hooks and tabs clear all chassis slots

Figure 2-1. Remove the RES-21XR3 Protective Access Cover

2.1.2 Memory Modules

The RES-21XR3 supports memory according to *Table 2-1*.

Table 2-1. RES-21XR3 Memory Capacity

Motherboard	Memory Parameters					
	Capacity	DDR3 Registered ECC	Speed (MHz)	Number of DIMMS	Pins per DIMM	Max DIMM size
X8STi series	24 GB	Yes	1333/1066/800	6	240	4 GB

Caution: Exercise extreme caution when installing or removing Memory Modules to prevent any possible damage.

Table 2-2. RES-21XR3 Optimal Memory Population (CPU1 Installed)

DIMMs	Branch 0		Branch 1		Branch 2	
3 DIMMs	P1 DIMM1A		P1 DIMM2A		P1 DIMM3A	
6 DIMMs	P1DIMM1A	P1 DIMM1B	P1DIMM2A	P1 DIMM2B	P1 DIMM3A	P1 DIMM3B

When installing memory, follow these rules for best memory performance:

- It is strongly recommended that you *do not mix memory modules* of different speeds and sizes. If DIMMs of different speeds have been installed, verify that the BIOS setup is configured for the fastest speed of RAM used.

Caution: The motherboard will **NOT** boot if DIMM module(s) are installed in any of the Bank 2 slots but none in the Bank 1 slots.
The first DIMM module must be installed in DIMM1A (see *Figure 2-3* on page 2-5 for DIMM locations), and all Bank1 slots must be filled before populating any Bank 2 slot(s).

Maximum DIMM size per slot is 4 GB.

2.1.2.1 Installation

The following procedure explains how to install the DDR3 Memory Modules.

1. Loosen and remove the seven (7) screws securing the air-flow deflector (see *Figure 2-2*).

Figure 2-2. Remove RES-21XR3 Air-Flow Deflector

2. After the air-flow deflector is removed, the memory modules will be exposed (see *Figure 1-4* on page 1-6).

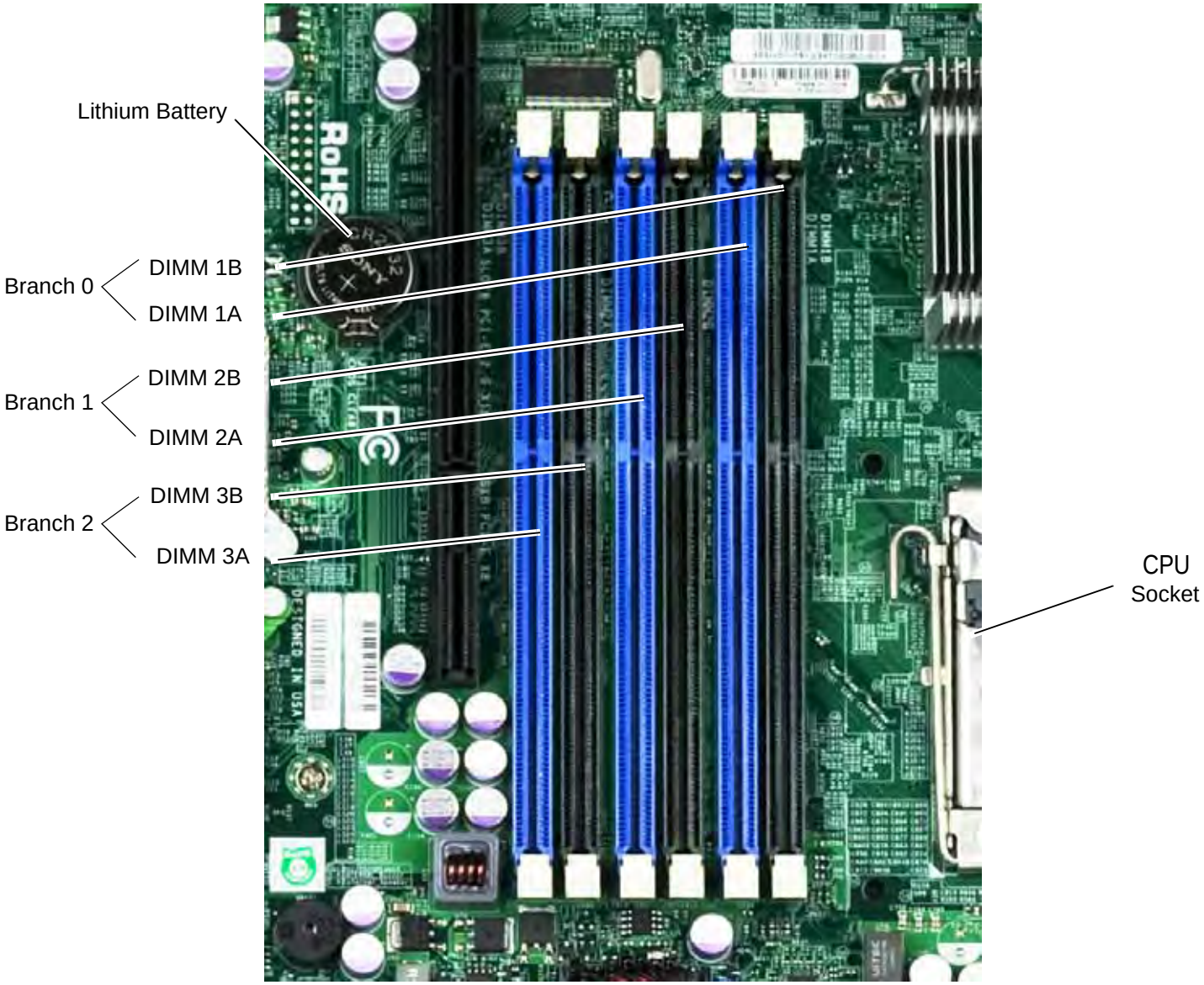


Figure 2-3. Memory Module Slot Locations

3. If a module is already seated in the slot you have selected for installation, remove it by gently pressing down and outward on the latches at both ends of the slot (see *Figure 2-4* on page 2-6), then pulling the old module directly up from the slot until it is free of the connector (see *Table 2-4*, page 2-6).

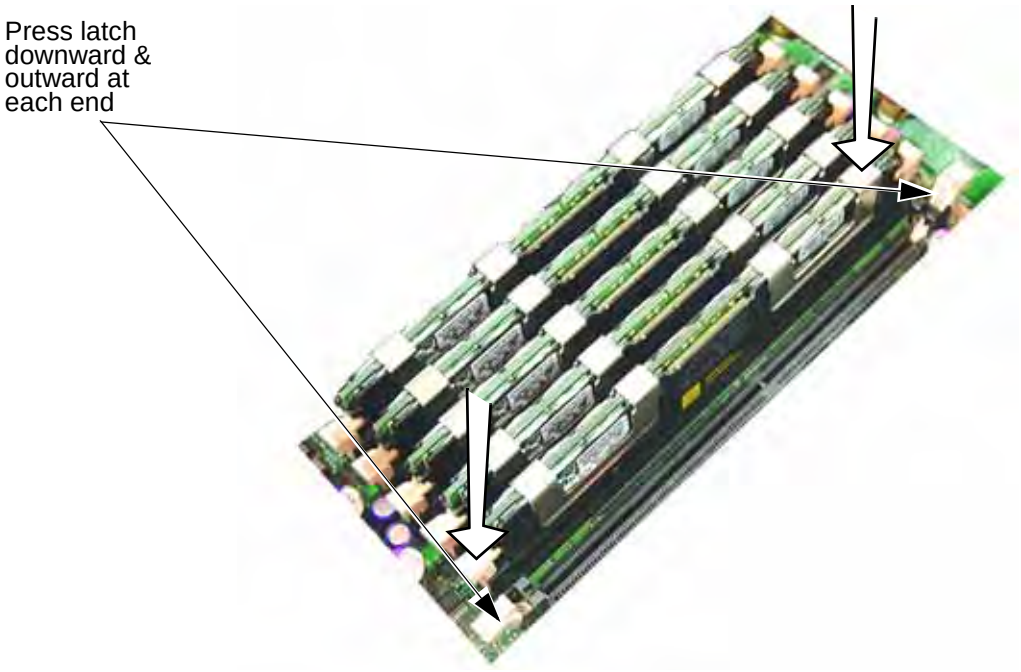


Figure 2-4. Memory Module Removal

4. Before inserting a new memory module into the vacant slot, make sure that the two latches are pulled outward away from the center of the slot.

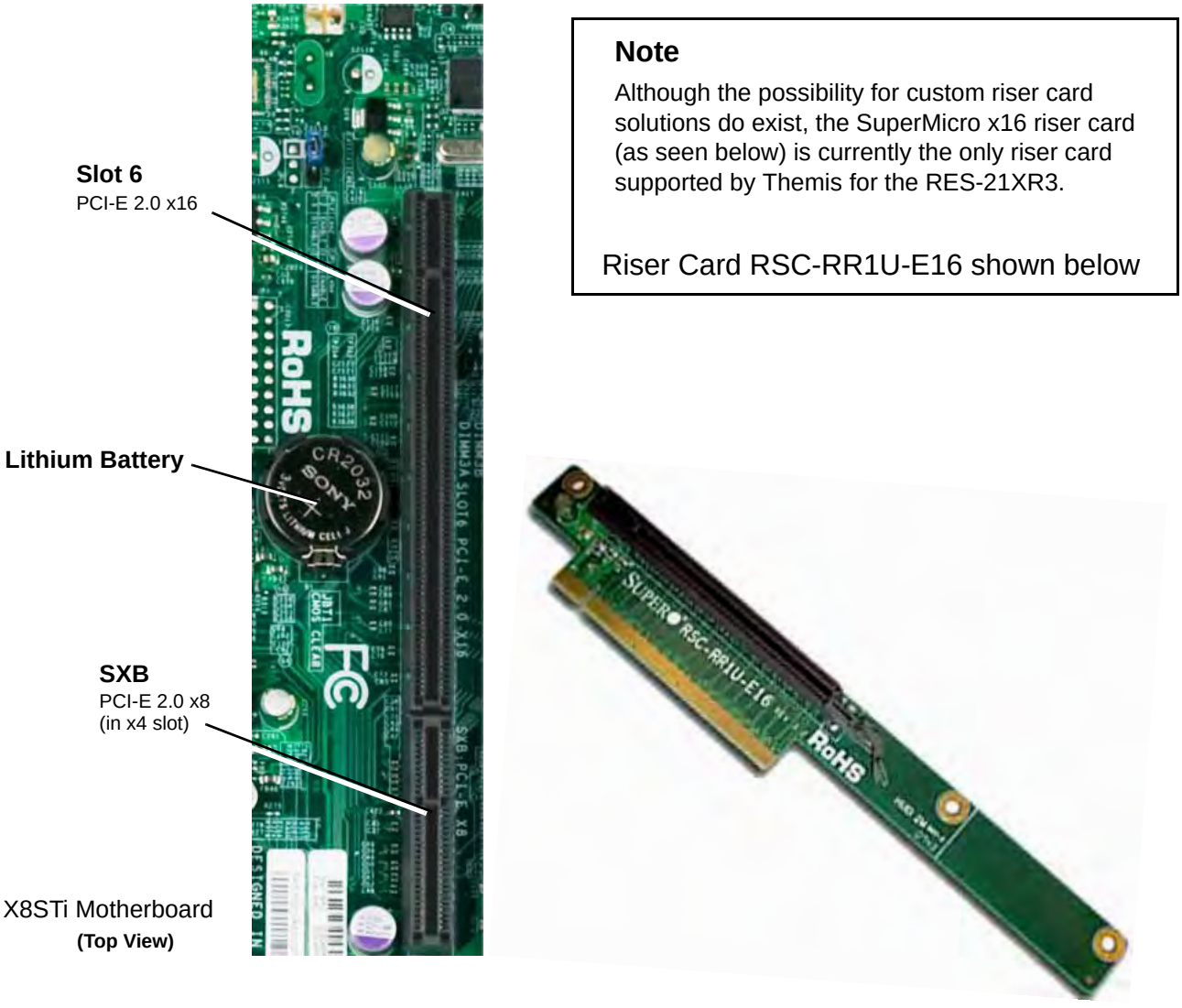
With the latches in the outward position, gently insert the new module vertically into its slot and press firmly downward until it snaps into place.

Note: Make sure the memory module has the proper orientation by aligning the alignment notch at the bottom edge with its counterpart ridge at the bottom of the slot.

5. If all the memory modules have been replaced in the system, replace the air flow diverter and secure it with the seven screws previously removed in Step 1 on page 2-4).

2.1.3 PCI Cards

Because of the unique design of the X8STi motherboard, the PCI card on RES-21XR3 must be installed on a x16 PCI Riser Card (see *Figure 2-5* below), positioned horizontally through the middle PCI slot on the rear I/O panel (see *Figure 2-8*, page 2-9). The middle PCI slot will allow for a full-size PCI card (Call Themis customer support for details relating to specific card configurations). See *Table 2-3* on page 2-8 for a list of popular Riser Cards that are supported by Themis.



Note

Although the possibility for custom riser card solutions do exist, the SuperMicro x16 riser card (as seen below) is currently the only riser card supported by Themis for the RES-21XR3.

Riser Card RSC-RR1U-E16 shown below

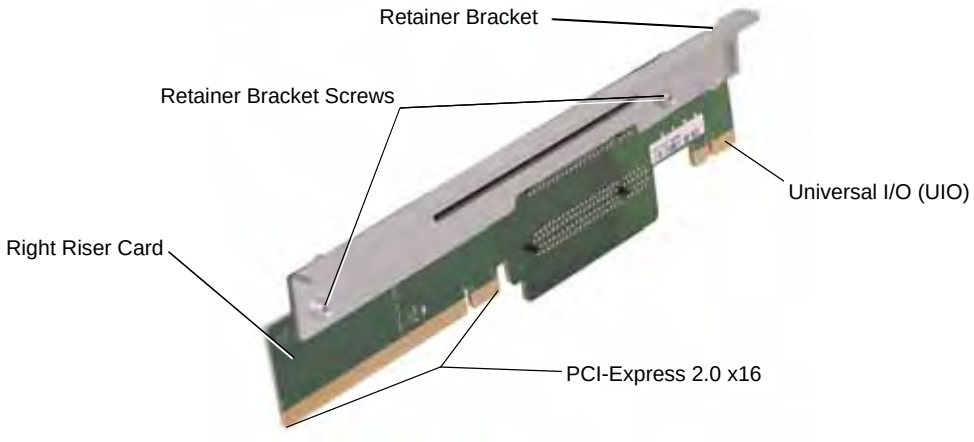
Figure 2-5. Positioning of the RES-21XR3 PCI Riser Cards

Table 2-3. Riser card and system configurations[a]

Riser Card Part Number	XR3 Box	Riser Card Output Slots			
		UIO	PCI-E x8	PCI-E x16	PCI-X
RSC-R1UU-E16	• RES-12XR3 • RES-22XR3	—	—	1	—
RSC-R1UU-2E8	• RES-12XR3 • RES-22XR3	—	2	—	—
RSC-R1UU-AXE8	• RES-12XR3 • RES-22XR3	—	1	—	1
RSC-R2UU-A4E8	• RES-22XR3 • RES-22XR3-FIO	—	4	—	—
RSC-R2UU-A3XE8	• RES-22XR3 • RES-22XR3-FIO	—	1	—	3
Themis Custom	• RES-22XR3 • RES-22XR3-FIO	—	—	2[b]	—
RSC-RR1U-E16	• RES-11XR3 • RES-21XR3	—	—	1	—

a—This list includes the most popular Riser Cards. Call Themis Customer Support for a complete list of supported riser card and system combinations.

b—One x16, one x16 in x8 slot



Note: P/N of Riser Card shown = RSC-R1UU-UE16. This figure is intended to demonstrate the retainer bracket only, as the X8STi does not have an UIO slot.

Figure 2-6. PCI Riser Cards are attached to a Retainer Bracket …

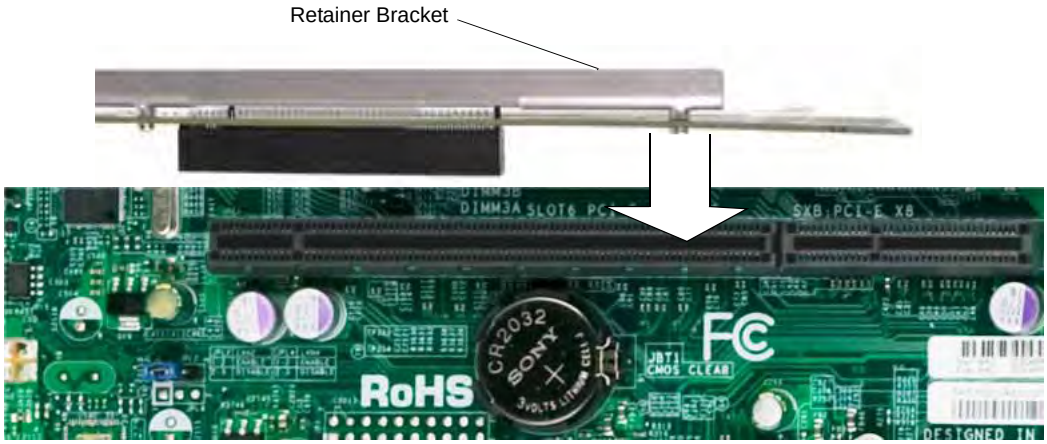


Figure 2-7. Then inserted into the PCI slot of the Motherboard

Please note that the RES-21XR3 with X8STi-Family motherboard only supports use of the middle PCI expansion slot at present time.

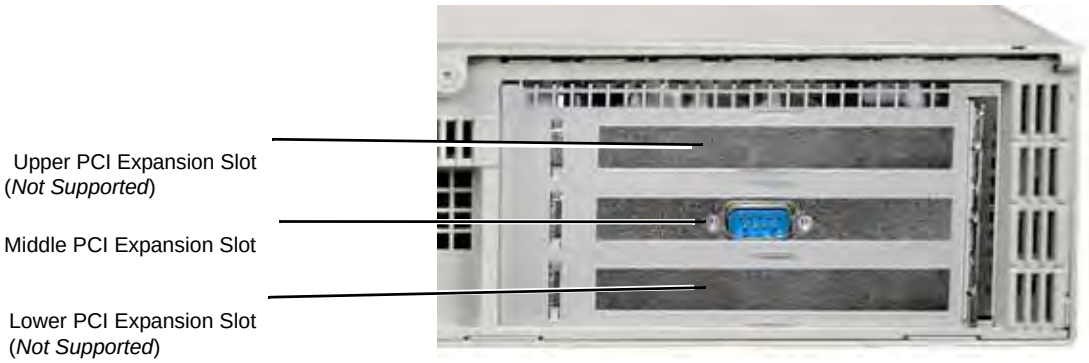


Figure 2-8. Horizontal I/O slots

2.1.3.1 Installing Cards

1. Locate the empty slot within which a card will be installed and remove the blank I/O faceplate corresponding to the slot (see *Figure 2-8*).
2. Carefully install each PCI card (lower card first) into the appropriate slot until all expansion cards have been installed, securing each I/O faceplate to the rear I/O panel—if permitted. Secure the side edge of each card according to the following instructions:

Lower PCI Expansion Slot—Themis has provided a pair of threaded standoffs to secure the card installed in the lower PCI expansion slot to the motherboard. Remove the standoff screws, install the PCI card into the lower slot, and secure the PCI card with the standoff screws.

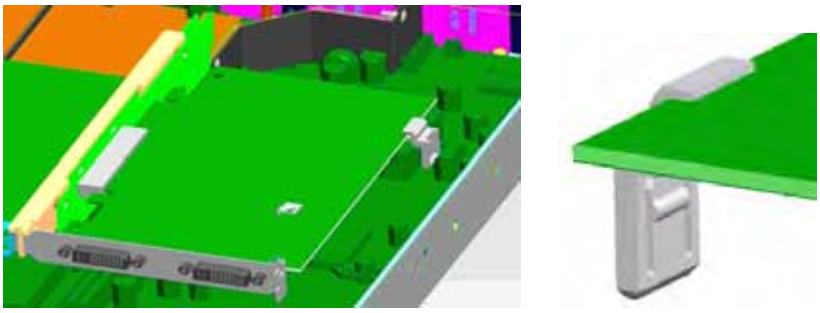


Figure 2-9. PCI Card Retainer Clip

Middle PCI Expansion Slot—Secure the middle and upper cards as indicated below.

Upper PCI Expansion Slot—After installing the upper PCI expansion card, install a PCI Retainer Clip—two if necessary—that was shipped with your order onto the edge of the PCI cards (see.*Figure 2-9*.)

3. Attach any internal I/O cables to the installed PCI cards, and carefully fold and tuck any exposed ribbon cables into the cabinet.

If you have no further installations to perform, close the RES-21XR3 chassis by refastening the top cover removed in step 1 on page 2.

Note: Call Themis Technical Support if the PCI card being installed does not conform to the rear panel shown in *Figure 2-8* on page 2-9.

The RES-21XR3 with RSC-RR1U-E16 Riser Card only support use of the middle PCI Expansion Slot.

2.1.4 Lithium Battery

2.1.4.1 Removing the Lithium Battery

Perform the following steps to remove the lithium battery:

1. Make sure the system is powered off (see “Operation” on page 2-20 to safely power down your RES-21XR3).

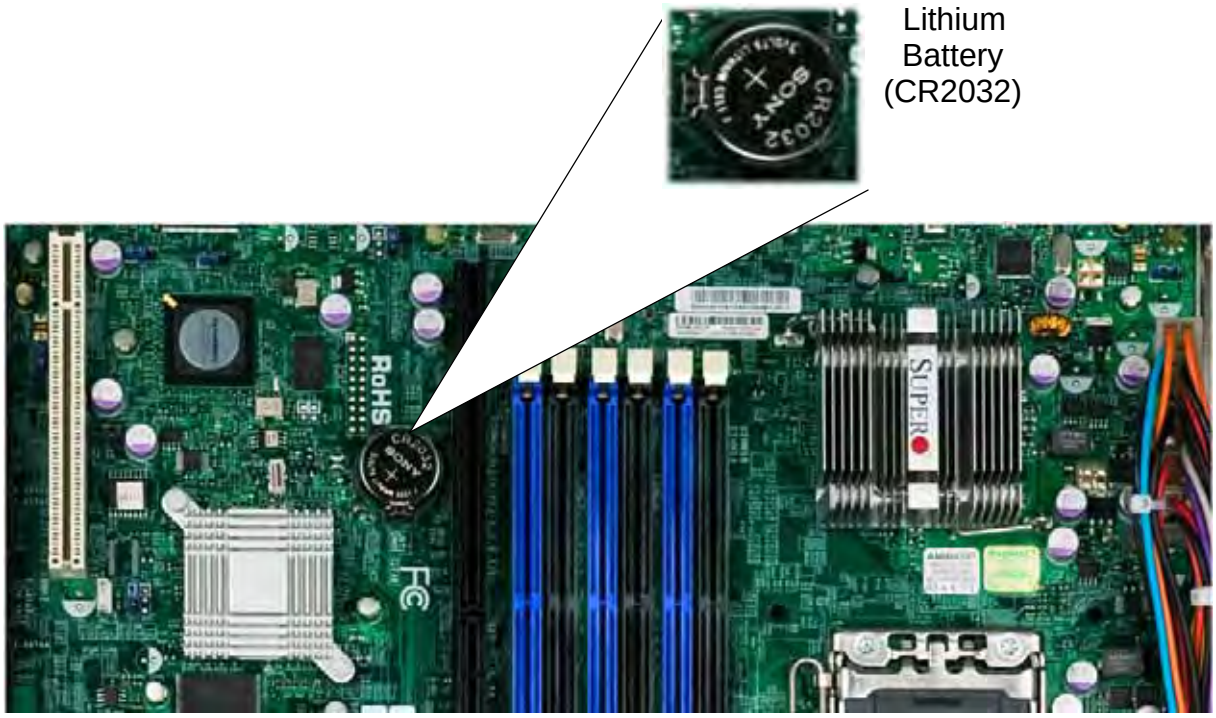


Figure 2-10. The RES-21XR3 Lithium Battery

2. Locate the lithium battery socket and squeeze the latch (see **A**, *Figure 2-11* on page 2-12) together until the battery lifts out of its socket. Carefully remove the battery without disturbing any of the motherboard components.

3. Remove the old battery and replace with a new battery (see next section).

A To release, squeeze the battery latch together... **B** . and remove the battery from socket

Figure 2-11. The RES-21XR3 Lithium Battery and Socket

2.1.4.2 Installing a Lithium Battery

Perform the following steps to insert a new lithium battery:

1. Tilt the replacement battery into the empty socket so that it is angled under the battery latch (see **B**, *Figure 2-11*).
2. Carefully press down on the battery until it clicks firmly into place.

2.1.5 SAS/SATA Storage Drive

Perform the following steps to remove and install a SAS/SATA storage drive.

Note: For SATA drives, the upper left-hand removable drive (SATA ID0) is designated as the boot drive.

The front bezel (door) of the RES-21XR3 must be unlocked and opened to access the SAS/SATA storage drives.

2.1.5.1 Opening the RES-21XR3 Front Doors

To access the removable storage drives, you must first open the front doors (see *Figure 2-12*). The knurled captive screw on the front of the RES-21XR3 allows the doors to lock without a key. To unlock the front doors, turn the screw counterclockwise and pull both bezel doors away from the chassis.

The accessory kit shipped with your RES-21XR3 contains two barrel lock keys. This provides you the option of unlocking/locking the storage drives.

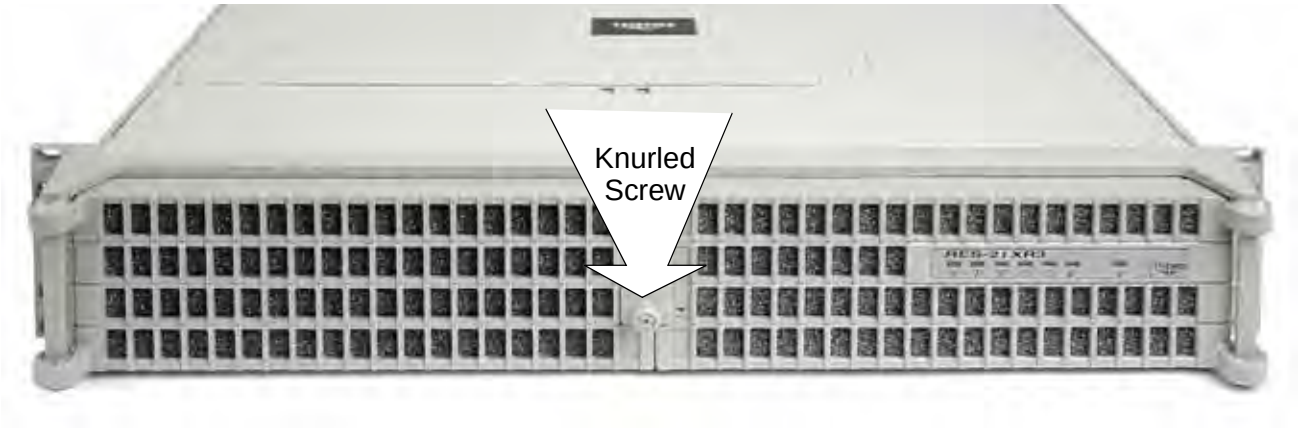


Figure 2-12. Opening the RES-21XR3 Front Doors

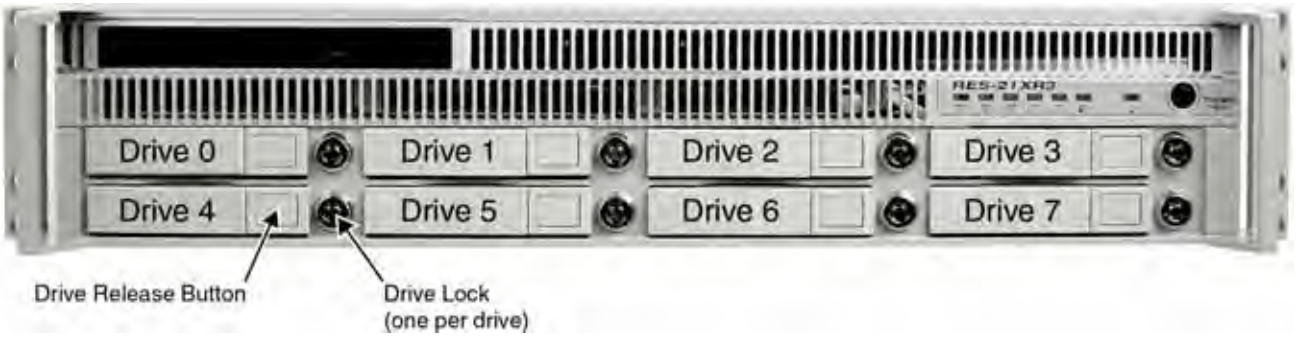


Figure 2-13. Unlocking the RES-21XR3 Storage Drives (Front Doors Removed)

2.1.5.2 Storage-Drive Removal

After opening the front doors, perform the following steps to remove and install a storage drive:

Note: Since RES-21XR3 storage drives are “hot-swappable”, it is not necessary to turn off system power in order to remove and replace a drive (except the operating system drive). However, after a warning has been broadcast to all users, the drive being replaced should be dismounted before being removed.

Consult your operating system manual for specific details.

1. Make sure the necessary precautions have been observed as per the previous *Note* (see “Operation” on page 2-20).
2. Locate the drive to be removed.
3. Insert the barrel lock key into the storage drive you want to remove, and turn it 45 degrees clockwise (presuming the storage drive is locked).
4. Firmly push in the latch lock until the latch handle releases from the drive.
5. Grab the latch handle and pull the drive completely away from its slot.

Caution: When pulling the storage drive from the chassis, hold it at the bottom to prevent it from falling and damaging the drive.

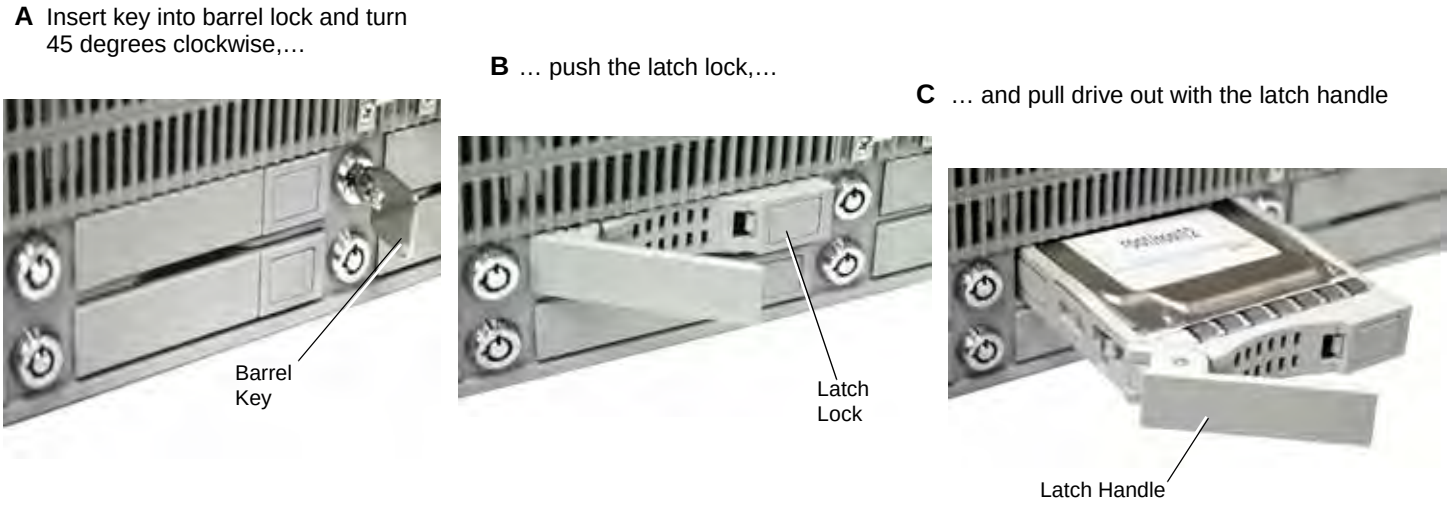

A Insert key into barrel lock and turn 45 degrees clockwise,…
B … push the latch lock,…
C … and pull drive out with the latch handle
Barrel Key
Latch Lock
Latch Handle

Figure 2-14. RES-21XR3 Storage Drive Removal

2.1.5.3 Storage-Drive Installation

To install a storage drive,

1. Make sure the latch handle of the drive to be installed is in the open position.
2. Properly orient the new drive and insert it into the vacant drive slot. If the drive cannot be inserted into the slot (it might be backwards), rotate it 180 degrees.
3. Push the drive toward the rear (DO NOT CLOSE the latch handle while pushing) until the drive is flush with the front of the chassis. The handle will swing closed when it comes into contact with the RES-21XR3 chassis.
4. When the drive is fully inserted in its slot, insert the key into the barrel lock and turn it 45 degrees counter-clockwise. The drive is now locked.

Caution: When in the closed position, the latch handle secures the drive to the chassis. If the handle is closed before the drive is fully inserted, the latch mechanism may not fully engage to secure the drive.

5. If you are installing another storage drive, repeat Steps 1–4 for each additional drive.

2.1.6 Hot-Swappable 80-mm Fan

The RES-21XR3 contains three high-speed 80-mm fans (see *Figure 2-15*, page 2-16), each of which can be “hot-swapped” in the field in the event of a fan failure.

2.1.6.1 Removing and Installing a 80-mm Fan

Perform the following steps to remove and install a 80-mm fan:

Note: Since RES-21XR3 fans are “hot-swappable”, it is not necessary to turn off system power in order to remove and replace a fan,

1. Push the fan lid lock left to unlock the fan lid (see *Figure 2-15* on page 2-16). Pull the fan lid upward exposing the three 80-mm fans.

2. Each fan is secured by a fan lock located on the side of the fan. To remove a fan, push the fan lock toward the front of the fan and pull the fan directly upward (see *Figure 2-15* below).

3. When the fan is removed, its 4-wire connector will automatically be disconnected from the chassis. Insert the replacement fan carefully into the empty fan slot until it is flush with the other fans. The 4-wire connector will automatically engage its counterpart successfully.

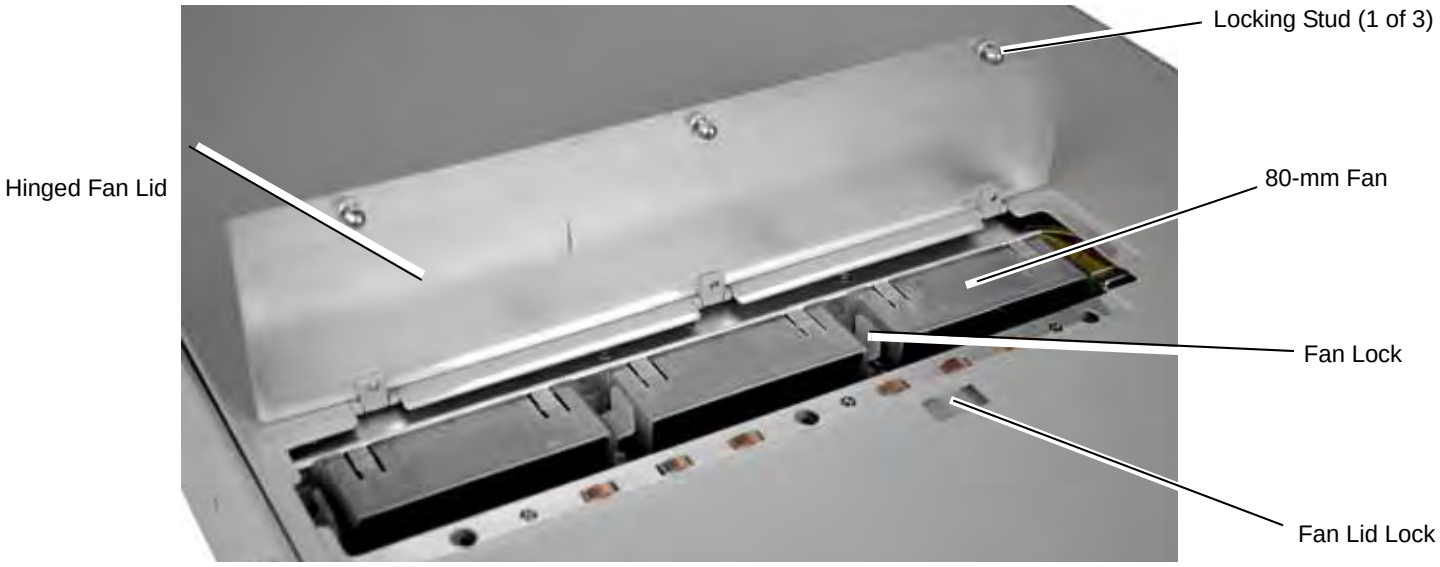


Figure 2-15. The RES-21XR3 Hot-Swappable 80-mm Fans

2.1.7 Power Supply

Each load-sharing (N+1 redundant) power supply can be hot-swapped while the system is still on and operational.

2.1.7.1 Removing a Power Supply

Perform the following steps to remove a power supply:

1. Loosen the two screws holding the power supply locking bracket to the chassis (see **A**, *Figure 2-16*, page 2-17). Place the bracket in a safe place.

2. Put the right index finger on the power supply extraction handle and the right thumb on the left side of the power supply locking lever (see **B**, *Figure 2-16*, page 2-17).

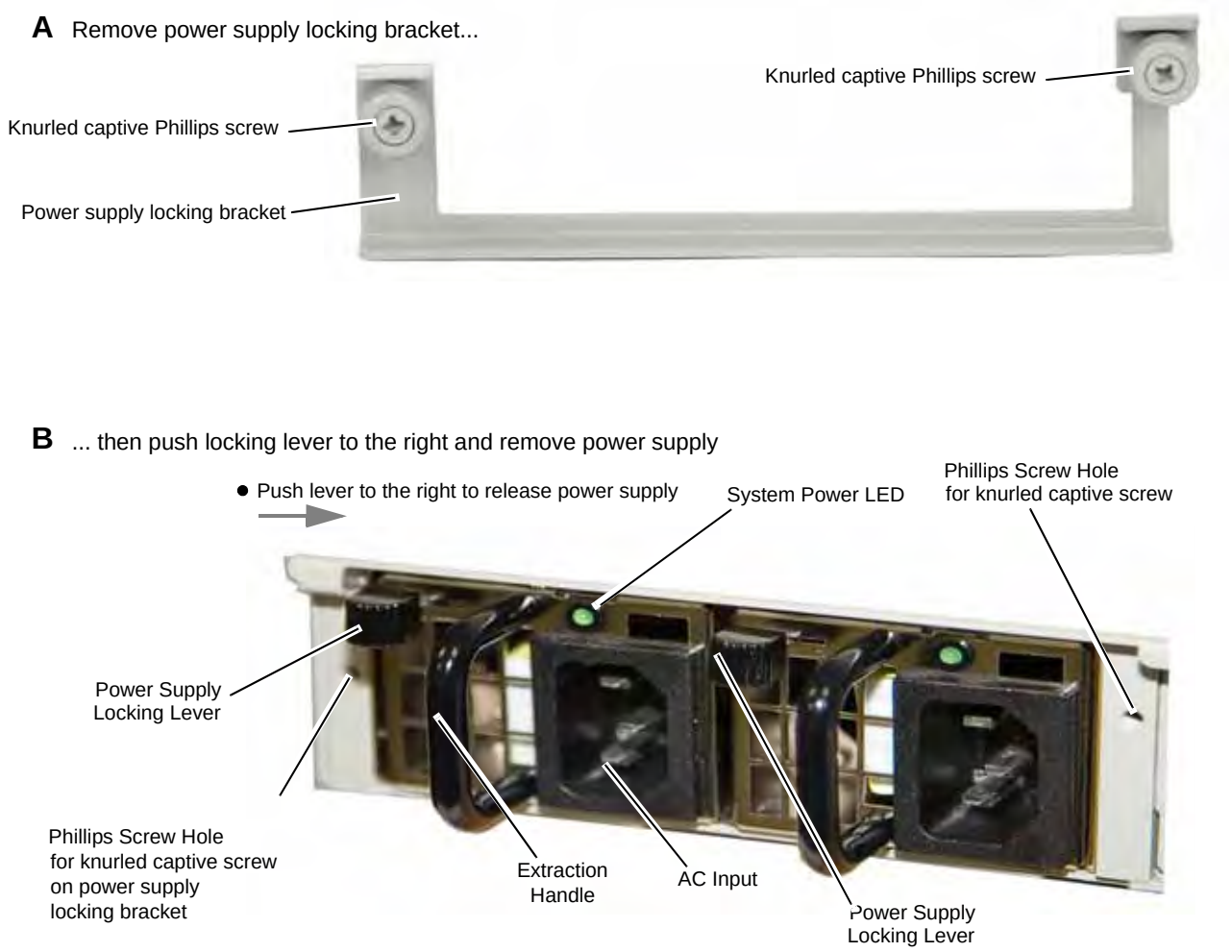


Figure 2-16. The RES-21XR3 Power Supply Locking Mechanism

3. Squeeze the locking lever toward the extraction handle and firmly pull the power supply from the chassis.

Caution: When pulling the power supply from the chassis, hold it at the bottom to prevent it from falling and damaging the unit.

2.1.7.2 Installing a Power Supply

Perform the following steps to install a power supply:

1. Insert the replacement power supply into an empty slot with the power LED at the top (see *Figure 2-16* on page 2-17).
2. Push the power supply carefully into its slot until it is firmly seated (a click will be heard when the locking lever is securely fastened to the chassis).
3. Replace and tighten the two captive screws to hold the power supply locking lever to the chassis (see *Figure 2-16* on page 2-17) to secure both power supplies.

Caution: When inserting the power supply into the chassis, hold it at the bottom to prevent it from falling and damaging the unit.

2.2 Rack Mounts

2.2.1 Mounting Brackets

The rack-mount brackets (flanges) are used to secure the chassis to the 19” rack (see *Figure 2-17*). Handles are used to pull the RES-21XR3 from the rack when rack-mount slides have been installed on the sides of the chassis (see following section).

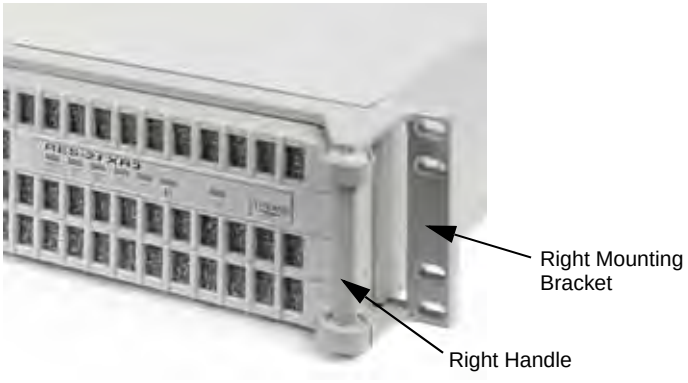


Figure 2-17. Right Rack-Mount Bracket

2.2.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-21XR3, for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and should be ordered at the time your system is purchased.

To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.

Caution: Any screws used to mount a slide to a RES-21XR3 chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

2.3 Operation

2.3.1 Plugging in the AC Power Cords

Before powering on the RES-21XR3, plug in the AC power cords as follows:

1. On the rear of the RES-21XR3, plug an AC power cord (shipped with unit) into the AC power socket on each power supply (see *Figure 2-18*).

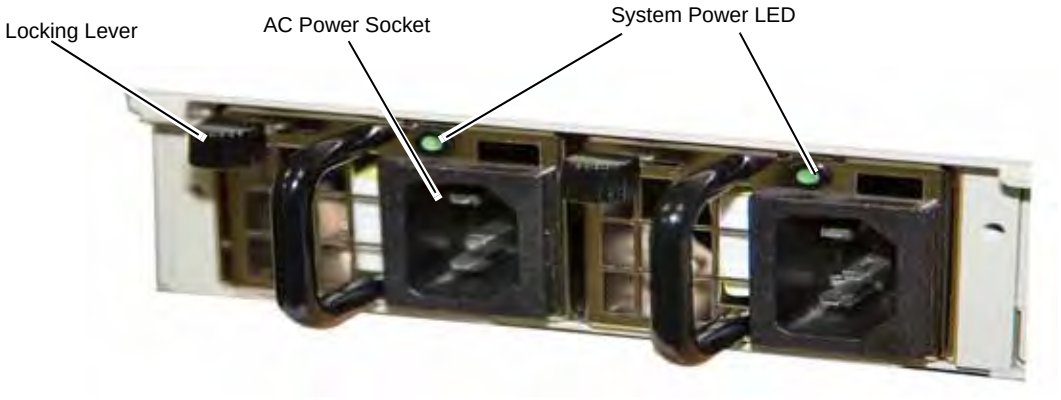


Figure 2-18. AC Power Socket and LED on the RES-21XR3 Rear

2.3.2 Turning the System On

1. Plug the AC power cord from each of the RES-21XR3 power supplies into a "live" AC outlet.
2. On the front of the RES-21XR3 push the system power on/off button (see *Figure 2-19*). This will cause the system POWER LED to light (green), as well as the power supply module to light (green).

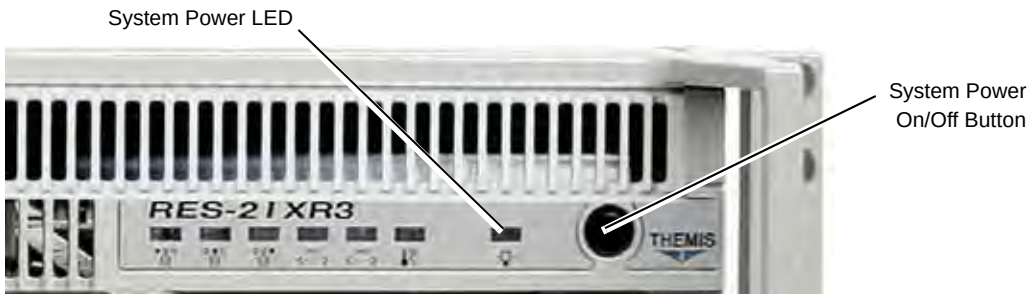


Figure 2-19. System Power Button and LED on the RES-21XR3 Front

2.3.3 Getting Started

2.3.3.1 Configuration

1. Make sure all SAS/SATA drives are installed (see "SAS/SATA Storage Drive" on page 2-12). Drive ID numbers are shown in *Figure 2-13* on page 2-13, Chapter 2. Changes may be made through the BIOS.
2. Connect a multiscan monitor to the VGA connector, or to the appropriate connector on the PCI-E graphics card (if installed).
3. Attach a PS/2 keyboard and mouse to the appropriate connectors on the rear I/O panel of the RES-21XR3 (see *Figure 1-5* on page 1-11)
4. Turn the system on (see previous section).

2.3.3.2 Linux Installation

The subject of installing the Linux operating system onto the RES-21XR3 is detailed in Appendix C, "Red Hat Enterprise Linux 5 Installation".

2.3.4 Turning the System Off

Caution: Before turning your system off, make sure to save all open files, properly close applications, and broadcast a warning to all users on any active networks.

1. To turn the RES-21XR3 power off, press and hold the system power on/off button (see *Figure 2-19*, page 2-20) for at least four (4) seconds. This will shut down the system and turn off the `POWER` LED, as well as the power supply LED.

   As an alternative, a modern operating system (Windows 9x or newer and Linux, for example) can turn off the system after a graceful OS software shutdown.

Installation Section

Chapter 3

BIOS Setup Utility

3.1 Introduction

Note: The information on this chapter is based on the Super Micro Computer, Inc., User Manuals for the X8STi Series motherboard installed in the system.

This chapter describes the starting, and using, the BIOS Setup Utility

To enter the AMI BIOS Setup Utility screens, press the <Delete> key while the system is booting up.

Note: In most cases, the <Delete> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, including <F1>, <F2>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

Note: The AMI BIOS has default text messages built in. Themis has the option to include, omit, or alter any of these text messages.

The AMI BIOS Setup Utility employs a key-based navigation system called “hot keys”. Most of the AMI BIOS setup utility “hot keys” can be employed at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, arrow keys, etc.

Note: Options printed in **Bold** are default settings.

3.1.1 How To Change the Configuration Data

The configuration data that determines the system parameters may be altered by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

3.1.2 Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test. While the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.

Caution: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreversible damage to the system. In no event shall Themis be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid potential boot failure.

3.2 Main BIOS Setup

When you first enter the AMI BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown in *Figure 3-1*.

Figure 3-1. Main BIOS Setup Screen

3.2.1 System Overview

The following BIOS information will be displayed:

3.2.1.1 System Time/System Date

Use this option to alter the system time and date. Highlight *System Time* or *System Date* using the arrow keys. Key in new values through the keyboard and press <Enter>. Press the <Tab> key to move between fields. The date has be entered in Day MM/DD/YY format. The time is entered in HH:MM:SS format.

Note: The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.

3.2.1.2 AMI BIOS

- **Version**: This item displays the BIOS revision employed in your system.
- **Build Date**: This item displays the date when this BIOS was finished.

3.2.1.3 Processor

The AMI BIOS will automatically display the status of the processor employed in your system:

- **CPU Type**: This item displays the type of CPU used in the motherboard.
- **Speed**: This item displays the speed of the CPU detected by the BIOS.
- **Physical Count**: This item displays the number of processors installed in your system as detected by the BIOS.
- **Logical Count**: This item displays the number of CPU Cores installed in your system as detected by the BIOS.

3.2.1.4 System Memory

This displays the size of memory available in the system:

- **Populated Size**: This item displays the populated memory size detected by the BIOS.
- **Available Size**: This item displays the memory size that is available for use.

3.3 Advanced Setup Configurations

Use the arrow keys to select Advanced Settings and hit <Enter> to access the sub-menu items, then select Boot Features:

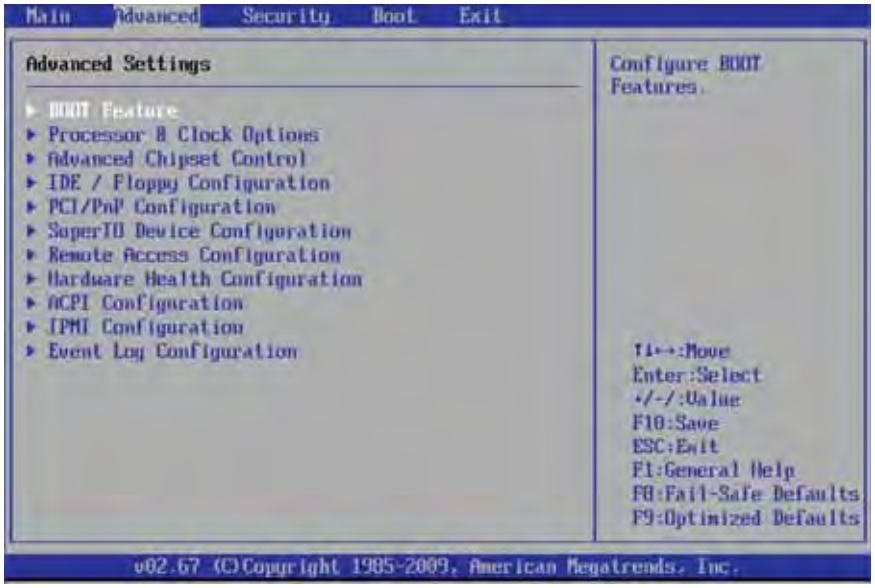


Figure 3-2. Advanced Settings

3.3.1 BOOT Features

3.3.1.1 Quick Boot

If Enabled, this option will skip certain tests during POST to decrease the time needed for system boot. The options are **Enabled** (default) and Disabled.

3.3.1.2 Quiet Boot

This option allows the bootup screen options to be modified between POST messages or the OEM logo. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** (default) and Disabled.

3.3.1.3 AddOn ROM Display Mode

This sets the display mode for Option ROM. The options are **Force BIOS** (default) and Keep Current.

3.3.1.4 Bootup Num-Lock

This feature selects the Power-on state for Numlock key. The options are Off and **On** (default).

3.3.1.5 PS/2 Mouse Support

Select Enabled to enable PS/2 Mouse support. Select **Auto** (default) to enable the onboard PS/2 mouse when a PS/2mouse is detected. The options are Enable, Disabled, and **Auto** (default).

3.3.1.6 Wait For 'F1' If Error

This forces the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled** (default)

3.3.1.7 Hit 'Del' Message Display

This feature displays “Press DEL to run Setup” during POST. The options are **Enabled** (default) and Disabled.

3.3.1.8 Watch Dog Function

If enabled, the Watch Dog Timer will allow the system to reboot when it is inactive for more than 5 minutes. The options are Enabled and **Disabled** (default).

3.3.1.9 Power Button Function

This setting allows you to decide if the power button will instantly turn the system off, or wait 4 seconds to turn off while the button is depressed. The options are 4 Seconds Override and **Instant Off** (default).

3.3.1.10 Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before a power loss. The options are Power-On, Power-Off and **Last State** (default).

3.3.1.11 Interrupt 19 Capture

Interrupt 19 is the software interrupt that controls the boot disk function. When this item is set to Enabled, the ROM BIOS of the host adaptors will “capture” Interrupt 19 at boot and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Disabled, the ROM BIOS of the host adaptors will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are **Enabled** (default) and Disabled.

3.3.2 Processor and Clock Options

This submenu allows the user to configure the Processor and Clock settings.

Warning: Take caution when changing the Advanced settings. An incorrect value, a very high DRAM frequency or incorrect DRAM timing may cause system to become unstable. When this occurs, revert to the default setting.

3.3.2.1 CPU Ratio

This feature allows the user to use the CPU clock multiplier to multiply CPU speed in order to enhance performance. Select Manual to manually set the multiplier setting. Select Auto to allow the BIOS to automatically select the CPU multiplier setting for your system. The options are **Auto** (default) and Manual.

3.3.2.2 Clock Spread Spectrum

Select Enable to use the feature of Clock Spectrum, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic interference caused by the components whenever needed. Select Disabled to enhance system stability. The options are **Disabled** (default) and Enabled.

3.3.2.3 Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware pre fetcher will pre fetch streams of data and instructions from the main memory to the L2 cache in the forward or backward manner to improve CPU performance. The options are Disabled and **Enabled** (default).

3.3.2.4 Adjacent Cache Line Prefetch (Available when supported by the CPU)

The CPU fetches the cache line for 64 bytes if this option is set to Disabled. The CPU fetches both cache lines for 128 bytes as comprised if **Enabled** (default).

3.3.2.5 MPS and ACPI MADT Ordering

Choose the method of ordering for the Multiple APIC Description Table (MADT). Select Modern Ordering for Microsoft Windows XP or later. Select Legacy Ordering for Microsoft Windows 2000 or earlier. The options are **Modern Ordering** (default) and Legacy Ordering.

3.3.2.6 Intel Virtualization Technology (Available when supported by the CPU)

Select Enabled to employ the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, producing multiple "virtual" systems in one physical computer. The options are **Enabled** (default) and Disabled.

Note: If there is any change to this setting, you must power off and restart the system for the change to take effect. Please refer to Intel's web site for detailed information.

3.3.2.7 Execute-Disable Bit Capability (Available when supported by the OS and the CPU)

Set to Enabled to enable the Execute Disable Bit which will allow the processor to delegate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled** (default). (Refer to Intel and Microsoft Web Sites for more information.).

3.3.2.8 Intel® AES-NI (When supported by the CPU)

Intel® AES instructions are a new set of instructions available beginning with the all new 2010 Intel® Core™ processor family based on the 32nm Intel® microarchitecture. These instructions enable fast and secure data encryption and decryption, using the Advanced Encryption Standard (AES). The options are **Disabled** (default) and Enabled.

3.3.2.9 Simultaneous Multi-Threading (Available when supported by the CPU)

Set to Enabled to use the Hyper-Threading Technology, which will result in increased CPU performance. The options are Disabled and **Enabled** (default).

3.3.2.10 Active Processor Cores

Set to Enabled to employ a processor's Second Core and beyond. (Please refer to Intel's web site for more information.) The options are **All** (default)**,** 1 and 2.

3.3.2.11 Intel® EIST Technology

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. **Please refer to Intel's web site for detailed information.** The options are Disable (Disable GV3) and **Enable (**Enable GV3).

3.3.2.12 Intel® Turbo Boost Configuration (Available if supported by the CPU)

Turbo Ratio Limit Program

Select Enabled to set the processor's clock ration in relation to the bus speed. The options are **Enabled** (default) and Disabled. The default value depends on the type of CPU installed.

Note: All example default values shown below represent that of an Intel® Core™ i7 965 Extreme Edition.

Core 1 Ratio Limit

This increases (multiplies) the processor's core 1 clock speed in relation to the bus speed. The default setting is 27. Press "+" or "-" on your keyboard to change this value.

Core 2–4 Ratio Limit

This increases the processor's core 2–4 clock speeds in relation to the bus speed. The default setting is 27 for core 2 and 26 for cores 3 and 4. Press "+" or "-" on your keyboard to change this value.

TDC Limit Override

This option will override the system's default electrical current setting for the processor. The options are **Enabled** (default) and Disabled.

TDC Limit Value

This option sets the processor's electrical current value. The default setting is 880. Press "+" or "-" on your keyboard to change this value.

TDP Limit Override

Select Enabled to override the default power setting for the processor. The Options are **Enabled** (default) and Disabled.

TDP Limit Value

Use this option to set the processor's power value. The default setting is 1040. Press "+" or "-" on your keyboard to change this value.

3.3.2.13 C1E Support

Select Enabled to use the feature of Enhanced Halt State. C1E significantly reduces the CPU's power consumption by reducing the CPU's clock cycle and voltage during a "Halt State." The options are Disabled and **Enabled** (default).

3.3.2.14 Intel® C-STATE Tech

If enabled, C-State is set by the system automatically to either C2, C3, or C4 state. The options are Disabled and **Enabled** (default).

3.3.2.15 C-State package limit setting

If set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are **Auto** (default), C1, C3, C6, and C7.

3.3.2.16 C1 Auto Demotion

When enabled, the CPU will conditionally demote C3, C6 or C7 requests to C1 based on un-core auto-demote information. The options are Disabled and **Enabled** (default).

3.3.2.17 C3 Auto Demotion

When enabled, the CPU will conditionally demote C6 or C7 requests to C3 based on un-core auto-demote information. The options are Disabled and **Enabled** (default).

3.3.2.18 ACPI T State

This feature enables the ACPI throttling support for the processor to save power. The options are **Disabled** (default) and Enabled.

3.3.2.19 DCA Technology

This feature accelerates the performance of TOE devices.

Note: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card. For this motherboard, the TOE device is built inside the ESB2 South Bridge chip. This feature is supported only by some types of processors.

The options are **Enabled** (default) and Disabled.

3.3.2.20 DCA Prefetch Delay

A DCA Prefetch is used with TOE components to prefetch data in order to shorten execution cycles and maximize data-processing efficiency. Prefetching too frequently can saturate the cache directory and delay necessary cache accesses. This feature reduces or increases the frequency the system prefetches data. The options are [8], [16], **[32]** (default), [40], [48], [56], [64], [72], [80], [88], [96], [104], [112], [120].

3.3.3 Advanced Chipset Control

The items included in the Advanced Settings submenu are listed below:

3.3.3.1 QPI and IMC Configuration

QuickPath Interconnect (QPI) is the connection between the CPU and the motherboard's I/O hub. Use this feature to modify speed and power management settings.

3.3.3.2 QPI Links Speed

This feature selects QPI's data transfer speed. the option are Slow-mode, and **Full Speed** (default).

3.3.3.3 QPI Frequency

This selects the desired QPI frequency. The options are **Auto** (default), 4.800 GT, 5.866GT, 6.400 GT.

3.3.3.4 QPI L0s and L1

QuickPath Interconnect (QPI) offers three power states called L0, L0s and L1:

- L0 is a normal operational state where data and control packets can be transmitted and received. All power management states are entered from this state.
- L0s is intended as a power saving state. It allows a link to quickly enter and recover from a power saving state without going through recovery.
- L1 is a power saving state that allows an additional power saving over L0s, but with additional resume (wake-up) latency.

Select Enabled to activate QPI power saving (L0s and L1 are automatically selected by the motherboard), select Disabled for normal operational state without any power-saving function. The options are Disabled and **Enabled** (default).

3.3.3.5 Memory Frequency

This feature forces the system memory to run at a different frequency than the default frequency. The available options are **Auto** (default), Force DDR-800, Force DDR-1066, and Force DDR-1333.

3.3.3.6 Memory Mode

The options are **Independent** (default), Channel Mirror, Lockstep, and Sparing.

Independent—All DIMMs are available to the operating system.

Channel Mirror—The motherboard maintains two identical copies of all data in memory for redundancy.

Lockstep—The motherboard uses two areas of memory to run the same set of operations in parallel.

Sparing—Memory sparing occurs when on-demand inactive memory is automatically activated by the system to temporarily replace failed memory until a service action can be performed (supported only on 2010 Intel® Core™ processor family based on the 32nm Intel® micro architecture).

3.3.3.7 Demand Scrubbing

Demand Scrubbing is a process that allows the CPU to correct correctable memory errors found on a memory module. When the CPU or I/O issues a demand-read command, and the read data from memory turns out to be a correctable error, the error is corrected and sent to the requestor (the original source). Memory is updated as well. Select Enabled to use Demand Scrubbing for ECC memory correction. The options are Enabled and **Disabled** (default).

3.3.3.8 Patrol Scrubbing

Patrol Scrubbing is a process that allows the CPU to correct correctable memory errors detected on a memory module and send the correction to the requestor (the original source). When this item is set to Enabled, the North Bridge will read and write back one cache line every 16K cycles, if there is no delay caused by internal processing. By using this method, roughly 64 GB of memory behind the North Bridge will be scrubbed every day. The options are Enabled and **Disabled** (default).

3.3.3.9 Throttling - Closed Loop

Throttling improves reliability and reduces power in the processor by automatic voltage control during processor idle states. Available options are Disabled and **Enabled** (default).

3.3.4 Intel VT-d

Select Enabled to enable Intel's Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to VMM through the DMAR ACPI Tables. This feature offers fully-protected I/O resource-sharing across the Intel platforms, providing the user with greater reliability, security and availability in networking and data-sharing. The settings are Enabled and **Disabled** (default).

3.3.5 SR-1OV Support

Select this item to support Single Root I/O Virtualization and Sharing (SR-IOV). The options are Enabled and **Disabled** (default).

3.3.6 Intel I/OAT

The Intel I/OAT (I/O Acceleration Technology) significantly reduces CPU overhead by leveraging CPU architectural improvements, freeing resources for other tasks. The options are Disabled and **Enabled** (default).

3.3.7 Active State Power Management

Select Enabled to start Active-State Power Management for signal transactions between L0 and L1 Links on the PCI Express Bus. This maximizes power-saving and transaction speed. The options are Enabled and **Disabled** (default).

3.3.8 Route Port 80h Cycles To

This feature allows the user to decide to which bus to send debug information. The options are Disabled, **PCI** (default) and LPC.

3.3.8.1 Extend PCI Hole

Select Enabled when using a 64-bit Operating System. The options are Disabled, and **Enabled** (default).

3.3.9 USB Functions

This feature allows the user to decide the number of onboard USB ports to be enabled. The Options are: Disabled, 2 USB ports, 4 USB ports, 6 USB ports, 8 Ports, 10 Ports and **12 USB ports** (default).

3.3.10 USB 2.0 Controller

Select Enabled to activate the onboard USB 2.0 controller. The options are **Enabled** (default) and Disabled.

3.3.11 Legacy USB Support

Select Enabled to use Legacy USB devices. If this item is set to Auto, Legacy USB support will be automatically enabled if a legacy USB device is installed on the motherboard, and vice versa. The settings are Disabled, Enabled, and **Auto** (default).

3.4 IDE/SATA/Floppy Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the IDE, SATA, and floppy devices and displays the following items:

3.4.1 Floppy A

This feature allows the user to select the type of floppy drive connected to the system. The options are Disabled, 360KB 5 1/4", 1.2MB 5 1/4", 720KB 3 1/2", **1.44MB 3 1/2"** (default) and 2.88MB 3 1/2".

3.4.2 SATA#1 Configuration

If Compatible is selected, it sets SATA#1 to legacy compatibility mode, while selecting Enhanced sets SATA#1 to native SATA mode. The options are Disabled, Compatible and **Enhanced** (default).

3.4.2.1 Configure SATA#1 as

This feature allows the user to select the drive type for SATA#1. The options are **IDE** (default), RAID and AHCI.

3.4.2.2 ICH RAID CodeBase (Available if RAID is selected above)

Select Intel to enable the Intel SATA Host RAID Utility. Select Adaptec to use the Adaptec Host RAID Utility. The options are **Intel** (default) and Adaptec.

3.4.3 SATA#2 Configuration (Available when the option-IDE is selected under "Configure SATA #1 as" above.)

Selecting Enhanced will set SATA#2 to native SATA mode. The options are Disabled, and **Enhanced** (default).

3.4.4 IDE Detect Timeout (sec)

Use this feature to set the time-out value for the BIOS to detect the ATA, ATAPI devices installed in the system. The options are 0 (sec), 5, 10, 15, 20, 25, 30, and **35** (default).

3.4.5 Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master, and Fourth IDE Master

These settings allow the user to set the parameters of Primary IDE Master/Slave, Secondary IDE Master/Slave, Third and Fourth IDE Master slots. Hit <Enter> to activate the following submenu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the submenu are:

3.4.5.1 Type

Select the type of device connected to the system. The options are Not Installed, **Auto** (default), CD/DVD and ARMD.

3.4.5.2 LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a disk drive. In the LBA mode, the maximum drive capacity is 137 GB. For drive capacities over 137 GB, your system must be equipped with 48-bit LBA mode addressing. If not, contact your manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode. The options are Disabled and **Auto** (default).

3.4.5.3 Block (Multi-Sector Transfer)

Block Mode boosts the IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if Block Mode is not used. Block Mode allows transfers of up to 64 KB per interrupt. Select Disabled to allow data to be transferred from and to the device one sector at a time. Select Auto to allow data transfer from and to the device to occur multiple sectors at a time if the device supports it. The options are **Auto** (default) and Disabled.

3.4.5.4 PIO Mode

The IDE PIO (Programmable I/O) Mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto**, 0, 1, 2, 3, and 4.

Select **Auto** (default) to allow the AMI BIOS to automatically detect the PIO mode. Use this value if the IDE storage drive support cannot be determined.

Select 0—4 to allow the AMI BIOS to use PIO mode 0—4. It has a data transfer rate of 3.3 MB/s—16.6MB/s. See *Table 3-1* on page 3-17 for PIO Mode Select options.

Table 3-1. PIO Mode Select Options

Option Selected	PIO Mode	Max. Transfer Rate
0	PIO Mode 0	3.3 MB/s
1	PIO Mode 1	5.2 MB/s
2	PIO Mode 2	8.3 MB/s
3	PIO Mode 3	11.1 MB/s
4	PIO Mode 4	16.6 MB/s

3.4.5.5 DMA Mode

Select Auto to allow the BIOS to automatically detect IDE DMA mode when the IDE storage device support cannot be determined. The options are Auto (default), SWDMAn, MWDMAn, and UDMAn. See *Table 3-2* below for DMA Mode Select Options.

Table 3-2. DMA Mode Select Options

Option Selected	DMA Mode	Max. Transfer Rate
SWDMA 0	Single-Word DMA 0	2.1 MB/s
SWDMA 1	Single-Word DMA 1	4.2 MB/s
SWDMA 2	Single-Word DMA 2	8.3 MB/s
MWDMA 0	Multi-Word DMA 0	4.2 MB/s
MWDMA 1	Multi-Word DMA 1	13.3 MB/s
MWDMA 2	Multi-Word DMA 2	16.6 MB/s
UDMA 0	Ultra DMA 0	16.6 MB/s
UDMA 1	Ultra DMA 1	25 MB/s
UDMA 2	Ultra DMA 2	33.3 MB/s
UDMA 3	Ultra DMA 3	44.4 MB/s
UDMA 4	Ultra DMA 4	66.6 MB/s
UDMA 5	Ultra DMA 5	100 MB/s
UDMA 6	Ultra DMA 6	133 MB/s

3.4.5.6 Self-Monitoring Analysis and Reporting Technology (**S.M.A.R.T.)**

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select Auto to allow the AMI BIOS to automatically detect storage drive support. Select Disabled to prevent the AMI BIOS from using the S.M.A.R.T. Select Enabled to allow the AMI BIOS to use the S.M.A.R.T. to support hard drive disk. The options are Disabled, Enabled, and **Auto** (default).

3.4.5.7 32-Bit Data Transfer

Select Enable to enable the function of 32-bit IDE data transfer. The options are **Enabled** (default)and Disabled.

3.4.6 PCI/PnP Configuration

This feature allows the user to set the PCI/PnP configurations for the following items:

3.4.6.1 Clear NVRAM

This feature clears the NVRAM during system boot. The options are **No** (default) and Yes.

3.4.6.2 Plug & Play OS

Selecting Yes allows the OS to configure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** (default) to allow the AMI BIOS to configure all devices in the system.

3.4.6.3 PCI Latency Timer

This feature sets the latency Timer of each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32, **64** (default), 96, 128, 160, 192, 224, and 248.

3.4.6.4 PCI IDE BusMaster

When enabled, the BIOS uses PCI bus mastering for reading/writing to IDE drives. The options are Disabled and **Enabled** (default)**.**

3.4.6.5 PCIe IO Performance

This feature selects the setting for the IOH PCIE maximum payload size. The options are **128B** (default) and 256B**.**

3.4.6.6 Slot 6 Width

This feature selects the bus width of the motherboard's Slot 6 PCIE slot. The options are x4x4x4x4, x8x4x4, x8x8, x16 and **Auto** (default).

3.4.6.7 ROM Scan Ordering

This item determines what kind of option ROM activates over another. The options are **Onboard First** (default) and Add-on First.

3.4.6.8 Slot PCI 33MHz, PCI Slot from SXB, Slot 6 PCIE x16

Use this feature to enable or disable a PCI-E or a PCI slot. The options are Disabled and **Enabled** (default).

3.4.6.9 Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM Load Onboard LAN3 Option ROM/Load Onboard LAN4 Option ROM (X8STi- LN4 Only)

This feature is to enable LAN OPROM for PXE. This is to boot computers using a network interface. The options are **Disabled** (default) and Enabled.

3.4.6.10 Load SAS Option ROM (X8STi-3F Only)

This feature is to load the Serial Attached SCSI (SAS) option ROM, if available. The options are Disabled and **Enabled** (default).

3.4.6.11 Boot Graphics Adapter Priority

Use this feature to select the graphics controller to be used as the primary boot device. The options are Other, **Onboard VGA** (default) and Slot 6. Select Slot 6 if a graphics controller is installed in the CPU-controlled Slot 6 slot.

3.4.7 Super IO Device Configuration

3.4.7.1 Serial Port1 Address/Serial Port2 Address

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1 and Serial Port 2. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable. Select 3F8/IRQ4 to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. The options for Serial Port1 are Disabled, **3F8/IRQ4** (default), 2E8/IRQ3. The options for Serial Port2 are Disabled, **2F8/IRQ3** (default), and 2E8/IRQ3.

3.4.7.2 Onboard Floppy Controller

Select Enabled to enable the onboard Floppy Controller. The options are **Enabled** (default), and Disabled.

3.4.8 Remote Access Configuration

3.4.8.1 Remote Access

This allows the user to enable the Remote Access feature. The options are **Enabled** (default) and Disabled.

If Remote Access is set to Enabled, the following items will be displayed:

Serial Port Number

This feature allows the user decide which serial port to be used for Console Redirection. The options are COM1, COM2 and **COM3** (default). An additional option, **Onboard IPMI** (default) is featured on the X8STi-F/X8STi-3F motherboard only and becomes the default.

Serial Port Mode

This feature allows the user to set the serial port mode for Console Redirection. The options are **115200 8, n 1** (default); 57600 8, n, 1; 38400 8, n, 1; 19200 8, n, 1; and 9600 8, n, 1.

Flow Control

This feature allows the user to set the flow control for Console Redirection. The options are **None** (default), Hardware, and Software.

Redirection After BIOS POST

Select Disabled to turn off Console Redirection after Power-On Self-Test (POST). Select Always to keep Console Redirection active all the time after POST.

Note: This setting may not be supported by some operating systems.

Select Boot Loader to keep Console Redirection active during POST and Boot Loader. The options are Disabled, Boot Loader, and **Always** (default).

Terminal Type

This feature allows the user to select the target terminal type for Console Redirection. The options are ANSI, **VT100** (default), and VT-UTF8.

VT-UTF8 Combo Key Support

A terminal keyboard definition that provides a way to send commands from a remote console. Available options are **Enabled** (default) and Disabled.

Sredir Memory Display Delay

This feature defines the length of time in seconds to display memory information. The options are **No Delay** (default), Delay 1 Sec, Delay 2 Sec, and Delay 4 Sec.

3.4.9 Hardware Health Configuration

This feature allows the user to monitor hardware health of the system and review the status of each item when displayed.

3.4.9.1 CPU Overheat Alarm

This option allows the user to select the CPU Overheat Alarm setting which determines when the CPU OH alarm will be activated to provide warning of possible CPU overheat.

Warning: Any temperature that exceeds the CPU threshold temperature predefined by the CPU manufacturer may result in CPU overheat or system instability. When the CPU temperature reaches this predefined threshold, the CPU and system cooling fans will run at full speed.

The options are:

- **The Early Alarm**: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered as soon as the CPU temperature reaches the CPU overheat threshold as predefined by the CPU manufacturer.
- **The Default Alarm**: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered when the CPU temperature reaches about 5°C above the threshold temperature as predefined by the CPU manufacturer to give the CPU and system fans additional time needed for CPU and system cooling. In both the alarms above, please take immediate action as shown below.

3.4.9.2 CPU Temperature/System Temperature

This feature displays current temperature readings for the CPU and the System. The following items will be displayed for your reference only:

CPU Temperature

Note: The CPU thermal technology that reports absolute temperatures (Celsius/Fahrenheit) has been upgraded to a more advanced feature by Intel in its newer processors. The basic concept is that each CPU is embedded with unique temperature information sensing that the motherboard can read. This 'Temperature Threshold' or 'Temperature Tolerance' has been assigned at the factory and is the baseline by which the motherboard takes action during different CPU temperature conditions (i.e., by increasing CPU Fan speed, triggering the Overheat Alarm, etc.). Since CPUs can have different 'Temperature Tolerances', the installed CPU can now send its 'Temperature Tolerance' to the motherboard resulting in better CPU thermal management.
Supermicro has leveraged this feature by assigning a temperature status to certain thermal conditions in the processor (Low, Medium and High). This makes it easier for the user to understand the CPU's temperature status, rather than by just simply seeing a temperature reading (i.e., 25°C). For more information on thermal management, please refer to Intel's Web site at www.Intel.com.

The CPU Temperature feature will display the CPU temperature status as detected by the BIOS:

Low – This level is considered as the 'normal' operating state. The CPU temperature is well below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS (Fan Speed Control).

User intervention: No action required.

Medium – The processor is running warmer. This is a 'precautionary' level and generally means that there may be factors contributing to this condition, but the CPU is still within its normal operating state and below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS. The fans may adjust to a faster speed depending on the Fan Speed Control settings.

User intervention: No action is required. However, consider checking the CPU fans and the chassis ventilation for blockage.

High – The processor is running hot. This is a 'caution' level since the CPU's 'Temperature Tolerance' has been reached (or has been exceeded) and may activate an overheat alarm:

The Default Alarm – the Overheat LED and system buzzer will activate if the High condition continues for some time after it is reached. The CPU fan will run at full speed to bring the CPU temperature down. If the CPU temperature still increases even with the CPU fan running at full speed, the system buzzer will activate and the Overheat LED will turn on.

The Early Alarm – the Overheat LED and system buzzer will be activated exactly when the High level is reached. The CPU fan will run at full speed to bring the CPU temperature down.

Note: In both the alarms above, please take immediate action as shown below. See CPU Overheat Alarm to modify the above alarm settings.

User intervention: If the system buzzer and Overheat LED has activated, take action immediately by checking the system fans, chassis ventilation and room temperature to correct any problems.

Note: **1.** The system may shut down if it continues for a long period to prevent damage to the CPU.

IOH Temperature

This feature displays the absolute Input/Output Hub (IOH) temperature (i.e., 51° C).

System Temperature:

This feature displays the absolute system temperature (i.e. 34° C).

3.4.9.3 Fan 1—Fan 6 Reading

This feature displays the fan speed readings from fan interfaces Fan0 through Fan5.

3.4.9.4 Fan Speed Control Modes

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase for effective system cooling. Select Full Speed to allow the onboard fans to run at full speed (or 100% of the Pulse Width Modulation Duty Cycle) for maximum cooling. The Full Speed setting is recommended for special system configuration or debugging. Select Performance for the onboard fans to run at 70% of the Initial PWM Cycle for better system cooling. The Performance setting is recommended for high-power-consuming and high-density systems. Select Balanced for the onboard fans to run at 50% of the Initial PWM Cycle in order to balance the needs between system cooling and power saving. The Balanced setting is recommended for regular systems with normal hardware configurations. Select Energy Saving for the onboard fans to run t 30% of the Initial PWM Cycle for best power efficiency and maximum quietness. The Options are: Full Speed/FS (@100% of PWM Cycle), Performance/PF (@70% of PWM Cycle), Balanced/BL (@50% of PWM Cycle), and **Energy Saving/ES** (@30% of PWM Cycle)(default).

3.4.9.5 Voltage Monitoring

This feature displays the current voltage detected of the various components in the system:

Vcore, VDIMM, 5V, 12V, -12V, 3.3Vcc, 3.3VSB, VBAT, Vtt

3.4.10 ACPI Configuration

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

3.4.10.1 High Performance Event Timer

Select Enabled to activate the High Performance Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback, and reducing the dependency on other timestamp calculation devices such as an x86 RDTSC Instruction embedded in the CPU. The HPET is used to replace the 8254 Programmable Interval Timer. Options are **Enabled** (default) and Disabled.

3.4.10.2 ACPI Aware O/S

Enable ACPI support if it is supported by the OS to control ACPI through the Operating System. Otherwise, disable this feature. The options are **Yes** (default) and No.

3.4.10.3 AMI OEMB Table

This enables the OEMB table support. The options are **Enabled** (default) and Disabled.

3.4.10.4 ACPI APIC Support

Select Enabled to include the ACPI APIC Table Pointer in the RSDT (Root System Description Table) pointer list. The options are **Enabled** (default) and Disabled.

3.4.10.5 APIC ACPI SCI IRQ

When this item is set to Enabled, APIC ACPI SCI IRQ is supported by the system. The options are Enabled and **Disabled** (default).

3.4.10.6 Headless Mode

This feature is used to enable system to function without a keyboard, monitor, or mouse attached. The options are Enabled and **Disabled** (default).

3.4.10.7 ACPI Version Features

The options are ACPI v1.0, **ACPI v2.0** (default), and ACPI v3.0. Please refer to ACPI's website for further explanation: http://www.acpi.info/.

3.4.11 IPMI Configuration (X8STi-F/X8STi-3F Only)

Intelligent Platform Management Interface (IPMI) is a set of common interfaces that IT administrators can use to monitor system health and to manage the system as a whole. For more information on the IPMI specifications, please visit Intel's website at www.intel.com.

3.4.11.1 IPMI Firmware Version

This item displays the current IPMI Firmware Version.

3.4.11.2 Status of BMC

The Baseboard Management Controller (BMC) manages the interface between system management software and platform hardware. This is an informational feature which returns the status code of the BMC micro controller.

3.4.12 View BMC System Event Log

This feature is used to view any BMC events. It shows the total number of entries and will allow the viewing of each event by scrolling down on an Entry Number and pressing Enter.

3.4.12.1 Clear BMC System Event Log

This feature is used to view any BMC events. It shows the total number of entries and will allow the viewing of each event by scrolling down on an Entry Number and pressing Enter.

Caution: Any cleared information is unrecoverable. Make absolutely sure that you no longer need any data stored in the log before clearing the BMC Event Log.

3.4.13 Set LAN Configuration

Set this feature to configure the IPMI LAN adapter with a network address.

Channel Number

Enter the channel number for the SET LAN Config command. This is initially set to **[1]** (default). Press “+” or “-” on your keyboard to change the Channel Number.

Channel Number Status

This feature returns the channel status for the Channel Number selected above: “Channel Number is OK” or “Wrong Channel Number”.

IP Address Source

This feature selects whether the IP address, Subnet Mask and Gateway Address are automatically assigned by the network's DHCP server (Dynamic Host and Configuration Protocol) or manually entered by the user (Static). If Static is selected, the IP Address, Subnet Mask and Gateway Address must be manually entered below. If DHCP is selected, the next three items will be configured automatically and will be grayed out. The options are Static and **DHCP** (default).

IP Address

Enter the IP address for this machine. This should be in decimal and in dotted quad form (i.e., 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255.

Subnet Mask

Subnet masks tell the network which subnet this machine belongs to. The value of each three-digit number separated by dots should not exceed 255 (i.e., 255.255.255.0).

Gateway Address

Enter the Gateway address this machine will use (i.e., 192.168.10.1).

Mac Address

The BIOS will automatically enter the MAC address (also known as Hardware Address) of this machine, however it may be over-ridden. MAC addresses are 6 two-digit hexadecimal numbers (Base 16, 0 ~ 9, A, B, C, D, E, F) separated by dots. (i.e., 00.30.48.D0.D4.60)

This sets the pre-determined time to delay PEF alerts after system power-ups and resets. Refer to Table 24.6 of the IPMI 1.5 Specification for more information at www.intel.com. The options are **No Delay** (default), 30 sec, 60 sec, 1.5 min, 2.0 min.

3.4.13.1 BMC Watch Dog Timer Action

Allows the BMC to reset or power down the system if the operating system hangs or crashes. The options are **Disabled** (default), Reset System, Power Down, Power Cycle.

BMC Watch Dog TimeOut [Min:Sec]

This option appears if BMC Watch Dog Timer Action (above) is enabled. This is a timed delay in minutes or seconds, before a system power down or reset after an operating system failure is detected. The options are **[5 Min]** (default), [1 Min], [30 Sec], and [10 Sec].

3.4.14 Event Log Configuration

3.4.14.1 View Event Log

Use this option to view the System Event Log.

3.4.14.2 Mark All Events as Read

This option marks all events as read. The options are OK and Cancel.

3.4.14.3 Clear Event Log

This option clears the Event Log memory of all messages. The options are OK and **Cancel** (default).

3.4.14.4 PCIE Event Log

Use this option to enable logging of errors encountered in the system's PCIe bus. The options are Yes and **No** (default).

3.4.14.5 Memory ECC Error Log

Use this option to enable logging of errors encountered in the system's memory. The options are **Yes** (default) and No

3.5 Security Settings

The AMI BIOS provides a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

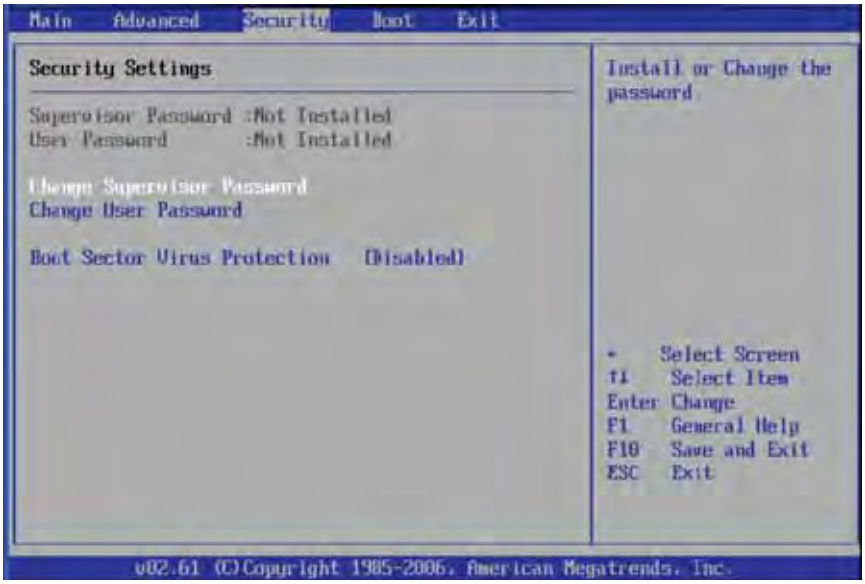


Figure 3-3. Security Settings

3.5.1 Supervisor Password

This item indicates if a Supervisor password has been entered for the system. Clear means such a password has not been used and Set means a supervisor password has been entered for the system.

3.5.2 User Password

This item indicates if a user password has been entered for the system. Clear means such a password has not been used and Set means a user password has been entered for the system.

3.5.3 Change Supervisor Password

Select this feature and press <Enter> to access the submenu, and then type in a new Supervisor Password.

3.5.4 User Access Level (Available when Supervisor Password is set as above)

Available options are **Full Access** (default): grants full User read and write access to the Setup Utility, View Only: allows access to the Setup Utility but the fields cannot be changed, Limited: allows only limited fields to be changed such as Date and Time, No Access: prevents User access to the Setup Utility.

3.5.5 Change User Password

Select this feature and press <Enter> to access the submenu, and then type in a new User Password.

3.5.6 Clear User Password (Available only when User Password has been set)

This item allows you to clear a user password after it has been entered.

3.5.7 Password Check

This item allows you to check a password after it has been entered. The options are **Setup** (default) and Always.

3.5.8 Boot Sector Virus Protection

When Enabled, the AMI BIOS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The options are Enabled and **Disabled** (default).

3.6 Boot Configuration

Use this feature to configure boot settings.

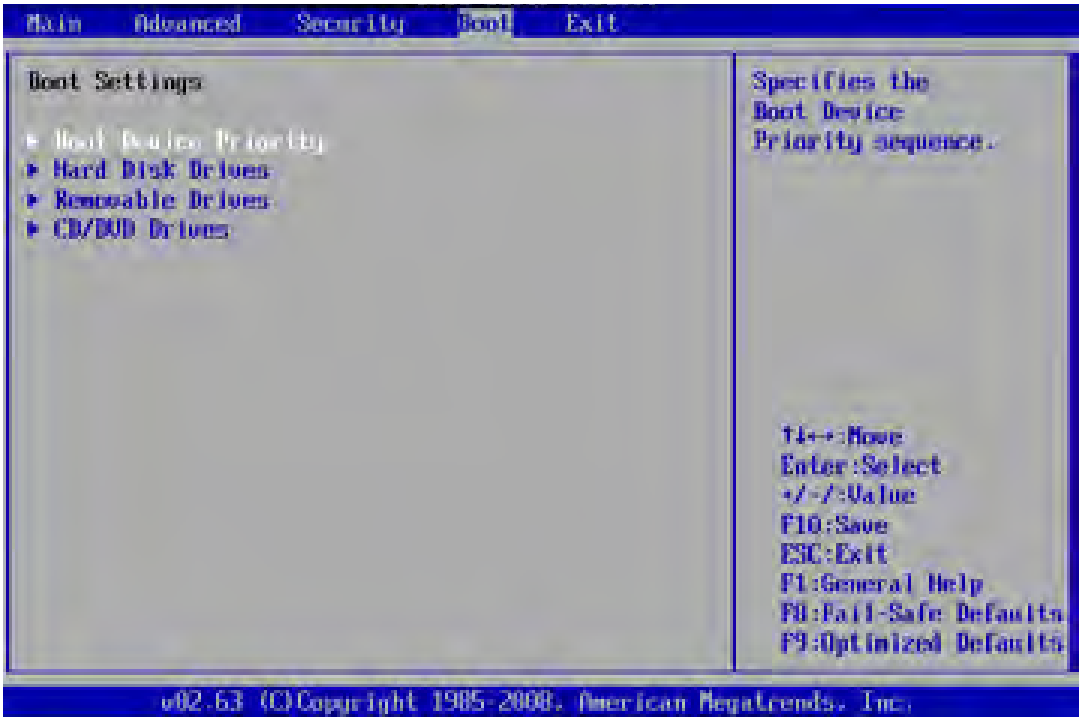


Figure 3-4. Boot Settings

3.6.1 Boot Device Priority

This feature allows the user to specify the sequence of priority for the Boot Device. The settings are 1st boot device, 2nd boot device, 3rd boot device, 4th boot device, 5th boot device and Disabled.

- 1st Boot Device - 1st Floppy Drive
- 2nd Boot Device - [USB: XXXXXXXXX]
- 3rd Boot Device - [SATA: XXXXXXXXX]
- 4th Boot Device - [Network: XXXXXXXXX]
- 5th Boot Device - [Network: XXXXXXXXX

3.6.2 Storage Drives

This feature allows the user to specify the boot sequence from all available storage drives. The settings are Disabled and a list of all storage drives that have been detected (i.e., 1st Drive, 2nd Drive, 3rd Drive, etc).

- 1st Drive - [SATA: XXXXXXXXX]

3.6.3 Removable Drives

This feature allows the user to specify the boot sequence from available Removable Drives. The settings are 1st boot device, 2nd boot device, and Disabled.

- 1st Drive
- 2nd Drive - [USB: XXXXXXXXX]/

3.6.4 CD/DVD Drives

This feature allows the user to specify the boot sequence from available CD/DVD Drives (i.e., 1st Drive, 2nd Drive, etc).

3.7 Exit Options

Select the Exit tab from the AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen.

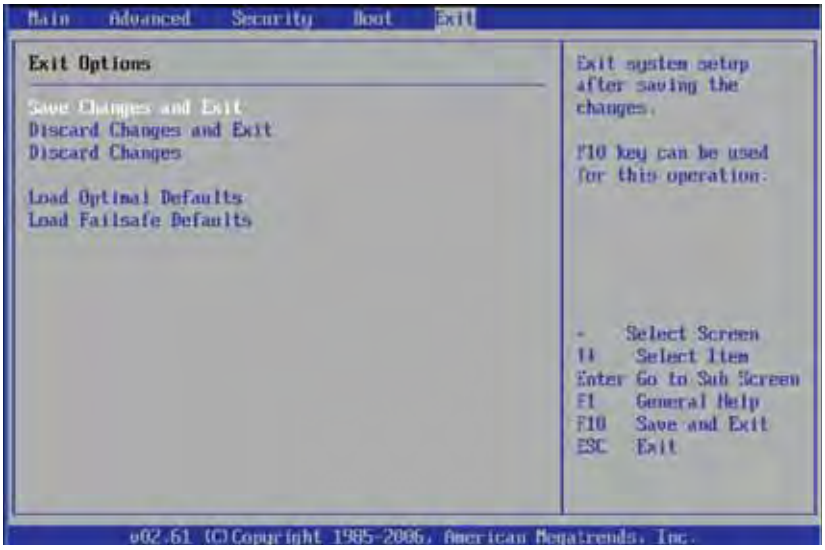

Main Advanced Security Boot Exit
Exit Options
Save Changes and Exit
Discard Changes and Exit
Discard Changes
Load Optimal Defaults
Load Failsafe Defaults
Exit system setup after saving the changes.
F10 key can be used for this operation.
- Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
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Figure 3-5. Exit Options

3.7.1 Save Changes and Exit

When you have completed the system configuration changes, select this option to leave the BIOS Setup Utility and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

3.7.2 Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

3.7.3 Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

3.7.4 Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then, select OK to allow the AMI BIOS to automatically load Optimal Defaults to the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

3.7.5 Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not for maximum performance.

Appendix A

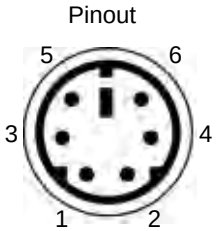
Connector Pinouts

This appendix provides connector pinouts for all standard user I/O interfaces on the rear I/O panel of the RES-21XR3.

A.1 PS/2 Keyboard and Mouse

The RES-21XR3 provides a 6-pin **female** mini-DIN connector for the PS/2 keyboard, and another for the PS/2 mouse. Pinouts and signal definitions for both connectors are defined in *Table A-1*.

Table A-1. PS/2 Keyboard/Mouse Pinouts and Signal Definitions



Pin	Signal Name
1	Keyboard/Mouse data
2	*N/C*
3	Ground
4	Vcc (+5V)
5	Keyboard/Mouse clock
6	*N/C*

A.2 USB Ports

The RES-21XR3 supports two USB (Universal Serial Bus) ports (see *Figure A-1* for pinouts), USB 0 and USB 1, on the rear I/O panel. In addition, six USB ports are supported from internal headers: USB 2/3, USB 4/5, USB 6, and USB 7.

Pinout descriptions are listed in *Table A-2*.

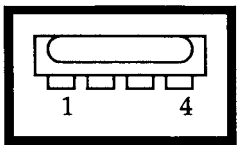


Figure A-1. USB Connector Pinout

Table A-2. USB Connector Signal Definitions

Pin	Signal Name	Pin	Signal Name
1	+5V	3	PO+
2	PO–	4	GND

A.3 Serial Ports

The RES-21XR3 supports one **male** DB9 serial port connector on the rear I/O panel (see *Figure A-2*)—TTYA (COM 1). Another serial port TTYB (COM 2) is accessed from the motherboard. COM 1 signal definitions are listed in *Table A-3*, page A-2.

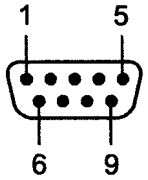


Figure A-2. COM 1 Serial Connector Pinout

Table A-3. COM 1 Serial Connector Signal Definitions

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	DCD	4	DTR	7	RTS
2	RXD	5	GND	8	CTS
3	TXD	6	DSR	9	RI

A.4 Gigabit Ethernet LAN Ports

The RES-21XR3 supports two RJ45 Gigabit Ethernet LAN port connectors—LAN 1 and LAN 2—each with two embedded LEDs (see *Figure A-3*). Pinout signal descriptions are listed in *Table A-4*.

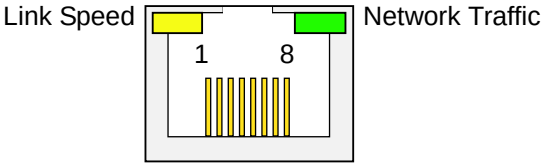


Figure A-3. Ethernet Connector, Type RJ45

Table A-4. RJ45 Ethernet Pinout Signals

Pin	Signal Name		Pin	Signal Name
1	TRD0+		5	TRD2+
2	TRD0–		6	TRD2–
3	TRD1+		7	TRD3+
4	TRD1–		8	TRD3–

- The color of the left LED indicates the LAN connection speed:
  - — Off = 10 MHz
  - — Green = 100 MHz
  - — Amber = 1 GHz
- The right LED, when lit, indicates LAN activity (network traffic).

A.5 VGA Display Port

The RES-21XR3 supports a single 15-pin (three 5-pin rows) **female** VGA graphics display port connector on the rear I/O panel (see *Figure A-4* for a connector pinout). Pinout signal descriptions are listed in *Table A-5*.

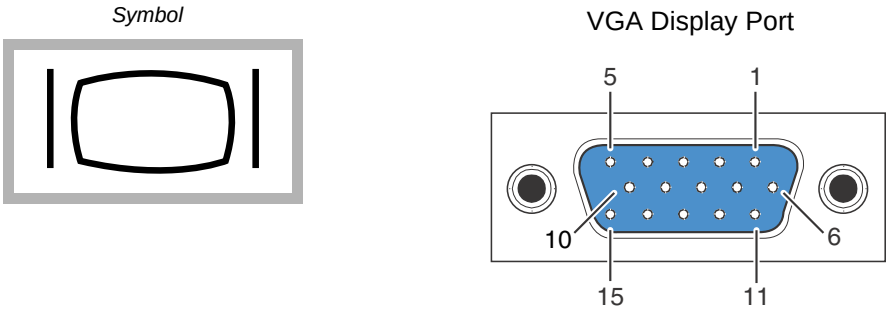


Figure A-4. VGA Connector Pinout

Table A-5. VGA Connector Pinout Signal Descriptions

Pin	Signal	Description
1	RED	Red video
2	GREEN	Green video
3	BLUE	Blue video
4	MS2	Monitor ID bit 2
5	GROUND	Ground (HSync)
6	GROUND	Red return
7	GROUND	Green return
8	GROUND	Blue return
9	NC	Key (no pin)
10	GROUND	Ground (VSync)
11	MS0	Monitor ID bit 0
12	MS1: SDA (DDC Data)	Monitor ID bit 1
13	HSYNC	Horizontal sync
14	VSYNC	Vertical sync
15	MS3: SCL (DDC CLK)	Monitor ID bit 3

A.6 IPMI Dedicated LAN Port

The Single IPMI dedicated Ethernet LAN port on the RES-21XR3 (X8STi-F/-3F) rear I/O panel has identical pinout and signal descriptions as the LAN Ethernet ports described in Section A.4 "Gigabit Ethernet LAN Ports", page 3. The IPMI port is located just above the two USB ports on the rear I/O panel. Note that the X8STi and X8STi-LN4 motherboards do not support IPMI, hence does not have the IPMI dedicate LAN prot installed.

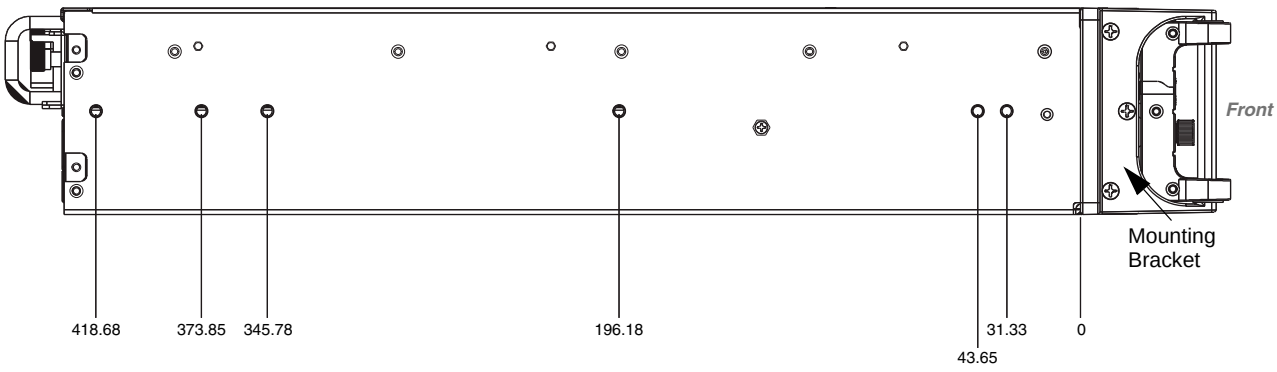
A.7 UID (Unit Identifier Switch)

The UID is used in conjunction with the UID LEDs. When you push the UID Switch, the UID Indicators (LEDs) will be turned on. As such, pushing the UID Switch again will turn off the UID Indicators (LEDs). These UID Indicators provide easy identification of a system unit that may be in need of service.

Appendix B

Rack-Mount Slide Installation

An *optional* set of two rack-mount slides (left side and right side) is available for all RES-21 systems, and should be ordered at the time of purchase. The RES-21XR3 chassis contains six threaded screw holes on each side to accommodate #8-32 size screws (included with the rack-mount slide kit); steel slides require four mounting holes, and aluminum slides require three mounting holes (see *Figure B-1*).



Legend

Screw Hole Size = #8-32

Note: All dimensions are given in millimeters (mm) and measured from the base of the chassis.

(See Figure B-2 on page B-3 for an exploded view.)

Figure B-1. Screw Locations for Rack-Mount Slides

Dimensions of the screw-hole patterns on the sides of the RES-21XR3 chassis for installing rack-mount slides are shown in *Figure B-1*. The required holes for a specific steel or aluminum slide will have to be measured before installation.

Caution: Any screws used to mount a slide to a RES-21XR3 chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

The rack-mount slide installation kit includes the following items:

a. Two inside slide sections

b. Two outside slide sections

c. Two front (short) slide brackets

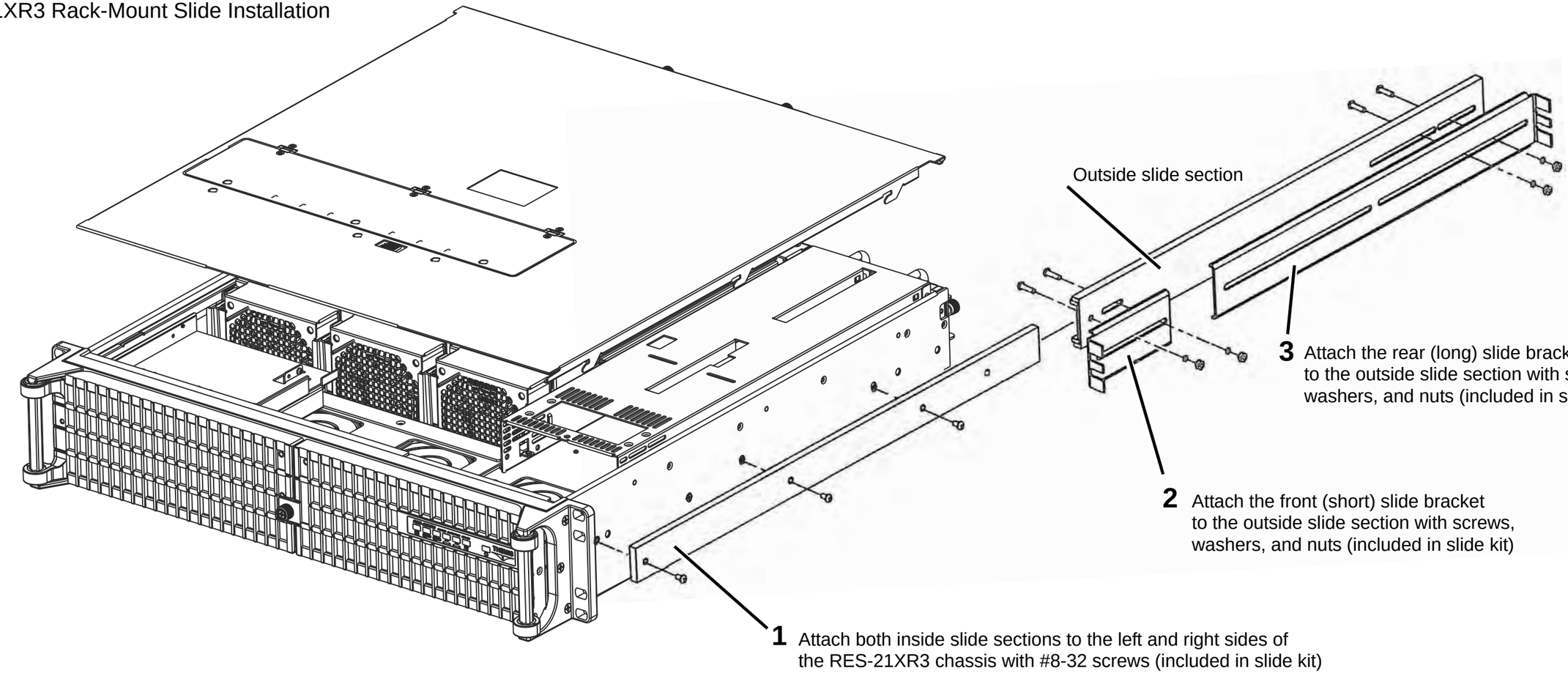
d. Two rear (long) slide brackets

e. Assorted screws, washers, and nuts

Follow these steps to install a steel rack-mount slide to the RES-21XR3 chassis:

1. Attach the inside slide section (see *Figure B-2* on page B-3) to both sides of the RES-21XR3 chassis using four #8-32 screws per side.
2. Measure the depth of the 19” equipment rack into which the RES-21XR3 system will be installed (this can vary from 24” to 30”).
3. Using the depth of the equipment rack, adjust and attach the front and rear slide brackets to the outside slide section using the screws, washers, and nuts provided with the slide kit.
4. With all slide brackets securely attached to both the right and left outside slide sections, install both sections to the inside right and inside left of a 19” rack with two bolts per bracket, making sure there is adequate room for the 2RU height (3.50”) of a RES-21XR3 system.
5. Carefully insert the RES-21XR3 system into the 19” rack so that the inside slides on both sides of the chassis travel smoothly into the channels of the outside slide sections. Push the system into the rack until the mounting brackets on the front of the chassis are flush with the front of the rack.
6. Secure the RES-21XR3 system to the 19” rack with two bolts on each side.

B RES-21XR3 Rack-Mount Slide Installation


Outside slide section
3 Attach the rear (long) slide bracket to the outside slide section with screws, washers, and nuts (included in slide kit)
2 Attach the front (short) slide bracket to the outside slide section with screws, washers, and nuts (included in slide kit)
1 Attach both inside slide sections to the left and right sides of the RES-21XR3 chassis with #8-32 screws (included in slide kit)

Note: Graphic shown above is for slide placement only; chassis shown may not be an accurate representation of the RES-21XR3.

Figure B-2. RES-21XR3 Rack-Mount Slide Installation

Appendix C

Red Hat Enterprise Linux 5 Installation

C.1 Introduction

Welcome to the Red Hat® Enterprise Linux® Installation Guide. This guide contains useful information to assist you during the installation of Red Hat Enterprise Linux via DVD device. From fundamental concepts such as installation preparation to the step-by-step installation procedure.

C.2 Installation

Step 1: Insert the Redhat Enterprise Linux 5 DVD and Power on the system; you will see the first installation screen with a boot prompt, press “ENTER” to begin installation (see *Figure C-1* on page C-2).

RED HAT
ENTERPRISE LINUX 5
- To install or upgrade in graphical mode, press the key.
- To install or upgrade in text mode, type: .
- Use the function keys listed below for more information.
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: _

Figure C-1. Power On after Linux DVD is Inserted into Drive

Step 2: Press the “tab” key to move focus to the “Skip” key, then press “Enter” key to Continue (see ***Figure C-2***).

Welcome to Red Hat Enterprise Linux Server
CD Found
To begin testing the CD media before installation press OK.
Choose Skip to skip the media test and start the installation.
OK
Skip
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

Figure C-2. Skip Key

Step 3: Press Enter and you will see the **Welcome** screen. Welcome screen does not prompt you for any input. From this screen you can access the Release Notes for Red Hat Enterprise Linux 5.0.0 by clicking on the Release Notes button (see *Figure C-3*.)

Figure C-3. Welcome Screen

Click on the **Next** button to continue.

Step 4: Using your mouse, select a language to use for the installation. The language you select here will become the default language for the operating system once it is installed. Selecting the appropriate language also helps target your time zone configuration later in the installation. The installation program tries to define the appropriate time zone based on what you specify on this screen (see *Figure C-4* on page C-4).

redhat
Additional Language Support
Select a language to use as the default language. The default language will be the language used on the system once installation is complete. If you choose to install other languages, it is possible to change the default language after the installation.
Red Hat Linux can install and support several languages. To use more than one language on your system, choose specific languages to be installed, or select all languages to have all available languages installed on the system.
Use the Reset button to cancel
Select the default language for the system:
English (USA)
Select additional languages to install on the system:
English (Great Britain)
English (Hong Kong)
English (India)
English (Ireland)
English (New Zealand)
English (Philippines)
English (Singapore)
English (South Africa)
English (Zimbabwe)
Faroese (Faroe Islands)
French (Belgium)
French (Canada)
French (France)
French (Luxembourg)
Select All
Select Default Only
Reset
Hide Help
Release Notes
Back
Next

Figure C-4. Language Selection

Once you select the appropriate language, click **Next** to continue.

Step 5: Using your mouse, select the correct layout type (for example, U.S. English) for the keyboard you would prefer to use for the installation and as the system default (see *Figure C-5* on page C-5).

Figure C-5. Selecting Layout Type

Once you have made your selection, click **Next** to continue.

Step 6: Enter the installation number, if you don't have an installation number; select the Skip Entering Installation Number Radio Button. Click OK, and if you did not enter an installation number, you'll be given a warning. Click Skip to continue (see *Figure C-6* on page C-6).

Figure C-6. Enter Installation Number

Click **Next** to continue.

Step 7: Partitioning allows you to divide your storage drive into isolated sections, where each section behaves as its own storage drive. Partitioning is particularly useful if you run multiple operating systems.

On this screen you can choose to create the default layout or choose to manual partition using the 'Create custom layout' option of **Disk Druid**.

The first three options allow you to perform an automated installation without having to partition your drive(s) yourself. If you do not feel comfortable with partitioning your system, it is recommended that you *do not* choose to create a custom layout and instead let the installation program partition for you.

You can configure an iSCSI target for installation, or disable a dmraid device from this screen by clicking on the 'Advanced storage configuration' button (see *Figure C-7* on page C-7).

RED HAT
ENTERPRISE LINUX 5
Installation requires partitioning of your hard drive. By default, a partitioning layout is chosen which is reasonable for most users. You can either choose to use this or create your own.
Remove linux partitions on selected drives and create default layout.
Select the drive(s) to use for this installation.
Advanced storage configuration
Review and modify partitioning layout
Release Notes
Back
Next

Figure C-7. Partitioning

Click **Next** to continue.

Step 8: Create default layout allows you to have some control concerning what data is removed (if any) from your system. Your options are:

- Remove all partitions on selected drives and create default layout — select this option to remove all partitions on your storage drive(s) (this includes partitions created by other operating systems such as Windows VFAT or NTFS partitions).
- Remove Linux partitions on selected drives and create default layout — select this option to remove only Linux partitions (partitions created from a previous Linux installation).
- This does not remove other partitions you may have on your storage drive(s) (such as VFAT or FAT32 partitions).
- Use free space on selected drives and create default layout — select this option to retain your current data and partitions, assuming you have enough free space available on your storage drive(s).

Using your mouse, choose the storage drive(s) on which you want Red Hat Enterprise Linux to be installed. If you have two or more drives, you can choose which drive(s) should contain this installation. Unselected drives, and any data on them, are not touched.

To review and make any necessary changes to the partitions created by automatic partitioning, select the **Review** option. After selecting **Review** and clicking **Next** to move forward, the partitions created for you in **Disk Druid** appear. You can make modifications to these partitions if they do not meet your needs (see *Figure C-8*).

redhat.
Installation requires partitioning of your hard drive.
By default, a partitioning layout is chosen which is
reasonable for most users. You can either choose
Remove all partitions on selected drives and create default layout.
Remove linux partitions on selected drives and create default layout.
Use free space on selected drives and create default layout.
Create custom layout.
Advanced storage configuration
Review and modify partitioning layout
Release Notes
Back
Next

Figure C-8. Reviewing Option

Click **Next** once you have made your selections to proceed.

Step 9: If you chose one of the automatic partitioning options and selected Review, you can either accept the current partition settings (click Next), or modify the setup using Disk Druid, the manual partitioning tool.

If you chose to create a custom layout, you must tell the installation program where to install Red Hat Enterprise Linux. This is done by defining mount points for one or more disk partitions in which Red Hat Enterprise Linux is installed. You may also need to create and/or delete partitions at this time (see *Figure C-9* on page C-9).

Figure C-9. Creating a Custom Layout

Click **Next.**

Step 10: Once you have configured your partitions, set up a boot loader. If you select “No” Boot Loader will be Installed, you’ll need to use a third-party boot loader such as Partition Magic or Microsoft’s TLDR. Unless you want to set up a Boot Loader Password or Configure Advanced Boot Loader Options (see *Figure C-10* on page C-10).

RED HAT
ENTERPRISE LINUX 5
The GRUB boot loader will be installed on /dev/sda.
No boot loader will be installed.
You can configure the boot loader to boot other operating systems. It will allow you to select an operating system to boot from the list. To add additional operating systems, which are not automatically detected, click 'Add.' To change the operating system booted by default, select 'Default' by the desired operating system.
Default
Label
Device
Red Hat Enterprise Linux Server
/dev/VolGroup00/LogVol00
Add
Edit
Delete
A boot loader password prevents users from changing options passed to the kernel. For greater system security, it is recommended that you set a password.
Use a boot loader password
Configure advanced boot loader options
Release Notes
Back
Next

Figure C-10. Setting Up Boot Loader

To configure more advanced boot loader options, such as changing the drive order or passing options to the kernel, be sure **Configure advanced boot loader options** is selected before clicking **Next**.

Step 11: Now that you have chosen which boot loader to install, you can also determine where you want the boot loader to be installed. You may install the boot loader in one of two places:

- **The master boot record (MBR)** — This is the recommended place to install a boot loader, unless the MBR already starts another operating system loader, such as System Commander.
- The MBR is a special area on your storage drive that is automatically loaded by your computer's BIOS, and is the earliest point at which the boot loader can take control of the boot process. If you install it in the MBR, when your machine boots, GRUB presents a boot prompt. You can then boot Red Hat Enterprise Linux or any other operating system that you have configured the boot loader to boot (see *Figure C-11* on page C-11).

- **The first sector of your boot partition** — This is recommended if you are already using another boot loader on your system. In this case, your other boot loader takes control first. You can then configure that boot loader to start GRUB, which then boots Red Hat Enterprise Linux.

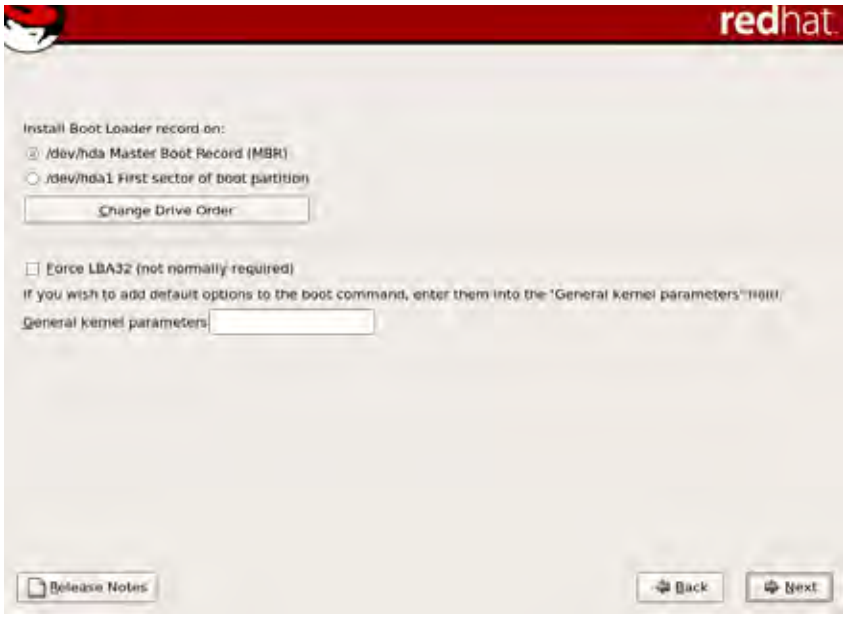

redhat
Install Boot Loader record on:
/dev/hda Master Boot Record (MBR)
/dev/hda1 First sector of boot partition
Change Drive Order
Force LBA32 (not normally required)
If you wish to add default options to the boot command, enter them into the "General kernel parameters" field.
General kernel parameters
Release Notes
Back
Next

Figure C-11. Master Boot Record (MBR)

If your system only uses Red Hat Enterprise Linux, you should choose the MBR.

Click the **Change Drive Order** button if you would like to rearrange the drive order or if your BIOS does not return the correct drive order. Changing the drive order may be useful if you have multiple SCSI adapters, or both SCSI and IDE adapters, and you want to boot from the SCSI device.

Click **Next**.

Step 12: The installation program automatically detects any network devices you have and displays them in the **Network Devices** list (see *Figure C-12*).

Figure C-12. Network Devices List

Step 13: Once you have selected a network device, click **Edit**. From the **Edit Interface** pop-up screen, you can choose to configure the IP address and Netmask (for IPv4 - Prefix for IPv6) of the device via DHCP (or manually if DHCP is not selected) and you can choose to activate the device at boot time.

If you select **Activate on boot**, your network interface is started when you boot (see *Figure C-13* on page C-13). If you do not have DHCP client access or you are unsure what to provide here, please contact your network administrator.

Figure C-13. Edit Interface Pop-Up Screen

Click **OK.**

Step 14: Set your time zone by selecting the city closest to your computer's physical location. Click on the map to zoom in to a particular geographical region of the world (see *Figure C-14* on page C-14).

From here there are two ways for you to select your time zone:

- Using your mouse, click on the interactive map to select a specific city (represented by a yellow dot). A red X appears indicating your selection.
- You can also scroll through the list at the bottom of the screen to select your time zone. Using your mouse, click on a location to highlight your selection.

Figure C-14. Selecting Time Zone

Click **Next**.

Step 15: Setting up a root account and password is one of the most important steps during your installation.

Your root account is similar to the administrator account used on Windows NT machines.

The root account is used to install packages, upgrade RPMs, and perform most system maintenance.

Logging in as root gives you complete control over your system (see *Figure C-15* on page C-15).

Figure C-15. Setting Up Root Account and Password

Click **Next**.

Step 16: Now that you have made most of the choices for your installation, you are ready to confirm the default package selection or customize packages for your system.

The Package Installation Defaults screen appears and details the default package set for your Red Hat Enterprise Linux installation. This screen varies depending on the version of Red Hat Enterprise Linux you are installing (see *Figure C-16* on page C-16).

To customize your package set further, select the **Customize now** option on the screen. Clicking **Next** takes you to the **Package Group Selection** screen.

You can select package groups, which group components together according to function (for example, **X Window System** and **Editors**), individual packages, or a combination of the two.

To select a component, click on the checkbox beside it:

RED HAT
ENTERPRISE LINUX 5
The default installation of Red Hat Enterprise Linux Server includes a set of software applicable for general internet usage. What additional tasks would you like your system to include support for?
Software Development
Web server
You can further customize the software selection now, or after install via the software management application.
Customize later
Customize now
Release Notes
Back
Next

Figure C-16. Package Installation Default Screen

Step 17: Select each component you wish to install.

Once a package group has been selected, if optional components are available you can click on Optional packages to view which packages are installed by default, and to add or remove optional packages from that group (see *Figure C-17* on page C-17). If there are no optional components, this button will be disabled

Figure C-17. Optional Packages

Click **Next**.

Step 18: Once you have selected the package groups of your choice, you get one last chance to go back before starting the installation process. Click Next if you're happy with your choices, or click Back to make changes (see *Figure C-18* on page C-18).

RED HAT
ENTERPRISE LINUX 5
Click next to begin installation of Red Hat Enterprise Linux Server.
A complete log of the installation can be found in the file '/root/install.log' after rebooting your system.
A kickstart file containing the installation options selected can be found in the file '/root/anaconda-ks.cfg' after rebooting the system.
Release Notes
Back
Next

Figure C-18. Option to Review or Continue

Click **Next**.

Step 19: Installation Starts (see *Figure C-19*).

Figure C-19. Installation Begins

Step 20: Congratulations! Your Red Hat Enterprise Linux installation is now complete!

The installation program prompts you to prepare your system for reboot. Remember to remove any installation media if it is not ejected automatically upon reboot (see *Figure C-20*).

RED HAT
ENTERPRISE LINUX 5
Congratulations, the installation is complete.
Remove any media used during the installation process and press the "Reboot" button to reboot your system.
Release Notes
Reboot

Figure C-20. Installation is Complete

After your computer's normal power-up sequence has completed, the graphical boot loader prompt appears at which you can do any of the following things:

- Press **Enter** — causes the default boot entry to be booted.
- Select a boot label, followed by Enter — causes the boot loader to boot the operating system corresponding to the boot label.
- Do nothing — after the boot loader's timeout period, (by default, five seconds) the boot loader automatically boots the default boot entry.

Do whatever is appropriate to boot Red Hat Enterprise Linux. One or more screens of messages should scroll by.

Step 21: Eventually, a login: prompt or a GUI login screen (if you installed the X Window System and chose to start X automatically) appears (see *Figure C-21*.

Figure C-21. Login Screen

Step 22: Once logged in, you are ready to use the desktop (see *Figure C-22*).

Figure C-22. Ready to use the Desktop

Appendix D

Optional Remote On/Off Switch

D.1 Remote On/Off Configuration

Customers interested in installing an *optional* switch from which to remotely turn the RES-21XR3 **on** or **off** are able to order a Remote On/Off Switch module that is easily installed in an available storage-drive bay (see *Figure D-1*, which shows the Remote On/Off Switch installed in an RES-32XR3/FIO system).

Figure D-1. Remote On/Off Switch Module

The Remote On/Off Switch module is installed after first removing one of the existing RES-21XR3 storage drives (any except the boot drive), then installing a cable with a standard male DB9 connector at one end and an On/Off switch (an LED is *optional*) at the other end.

When operational, if the RES-21XR3 is turned **OFF**, pressing the remote switch ON will turn the system on.

If the RES-21XR3 is turned **ON**, pressing the switch OFF for less than 4 seconds will gracefully shut down the system through the BIOS; pressing the switch OFF for 4 seconds or more results in a “hard” power off (equivalent to pulling the plug” on the system).

D.2 Remote Only Configuration

When the Remote On/Off Switch module is configured as an ON-only device, pressing the remote switch ON will turn the system on. Turning the RES system off, however, requires pressing the ON/OFF button located on the front of the RES-21XR3 chassis.

D.3 Ordering the Remote On/Off Switch

Because internal modifications must be made to the RES-21XR3 in order to support the Remote On/Off Switch module, the module must be ordered and installed at the time your system is ordered. Please contact Themis for ordering options, or further information regarding the Optional Remote On/Off Switch.

Appendix E

Optional RES Audio/USB/Serial Port Module

E.1 RES Audio/USB/Serial Port Custom Module

Customers interested in adding audio, USB, and serial port capabilities to the front of any RES system can easily order an *optional* RES Audio/USB/Serial Port Custom Module (see *Figure E-1*) that is installed at the Themis factory into an available storage-drive bay (see following *Caution*).

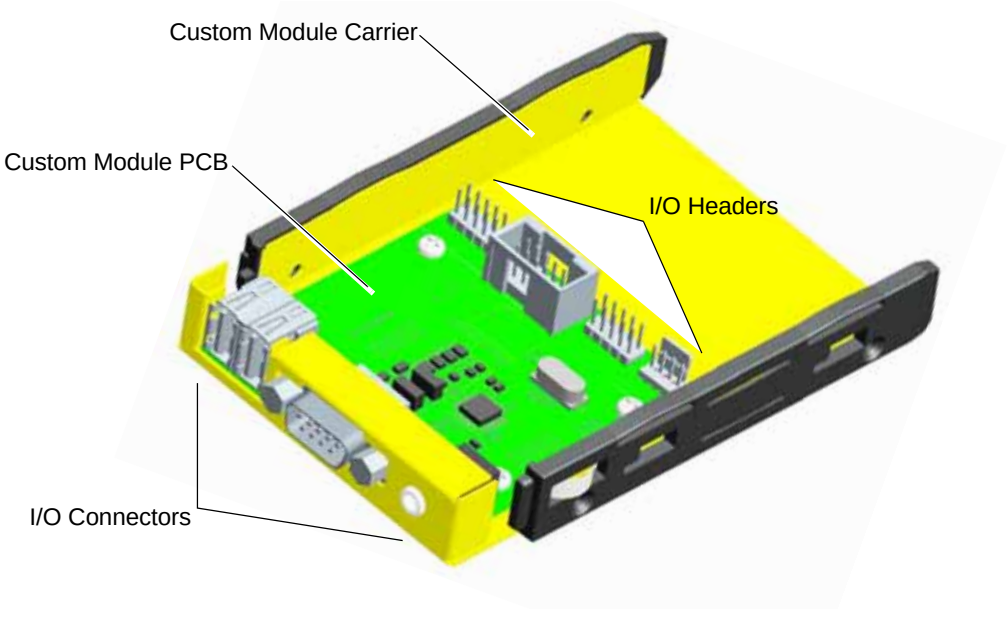


Figure E-1. RES Audio/USB/Serial Port Custom Module

Caution: Because connections must be made internally from the RES Custom Module to the RES motherboard, the RES Custom Module must be installed at the Themis factory before being shipped to the customer. Do not attempt to remove the RES Custom Module from its drive slot unless you have some hardware experience (see the following paragraph, *Figure E-2*, and *Figure E-3* on page E-3.

The RES Audio/USB/Serial Port Custom Module is installed after first removing one of the existing RES storage drives (any one except the boot drive) then connecting the appropriate I/O cables from the RES Audio/USB/Serial Port Custom Module to the external devices. After the storage drive has been removed from the system, cables from the internal RES motherboard are fed through the open drive slot and attached to the I/O headers on the top surface of the Custom Module PCB, and the Module is inserted into the vacant drive slot (see *Figure E-2*). [Note that a RES-32XR3/FIO is shown in this Appendix, although the Module may be installed into any RES system.] *Figure E-3* on page E-3 shows the internal connections that are made between the RES Custom Module and the RES motherboard.

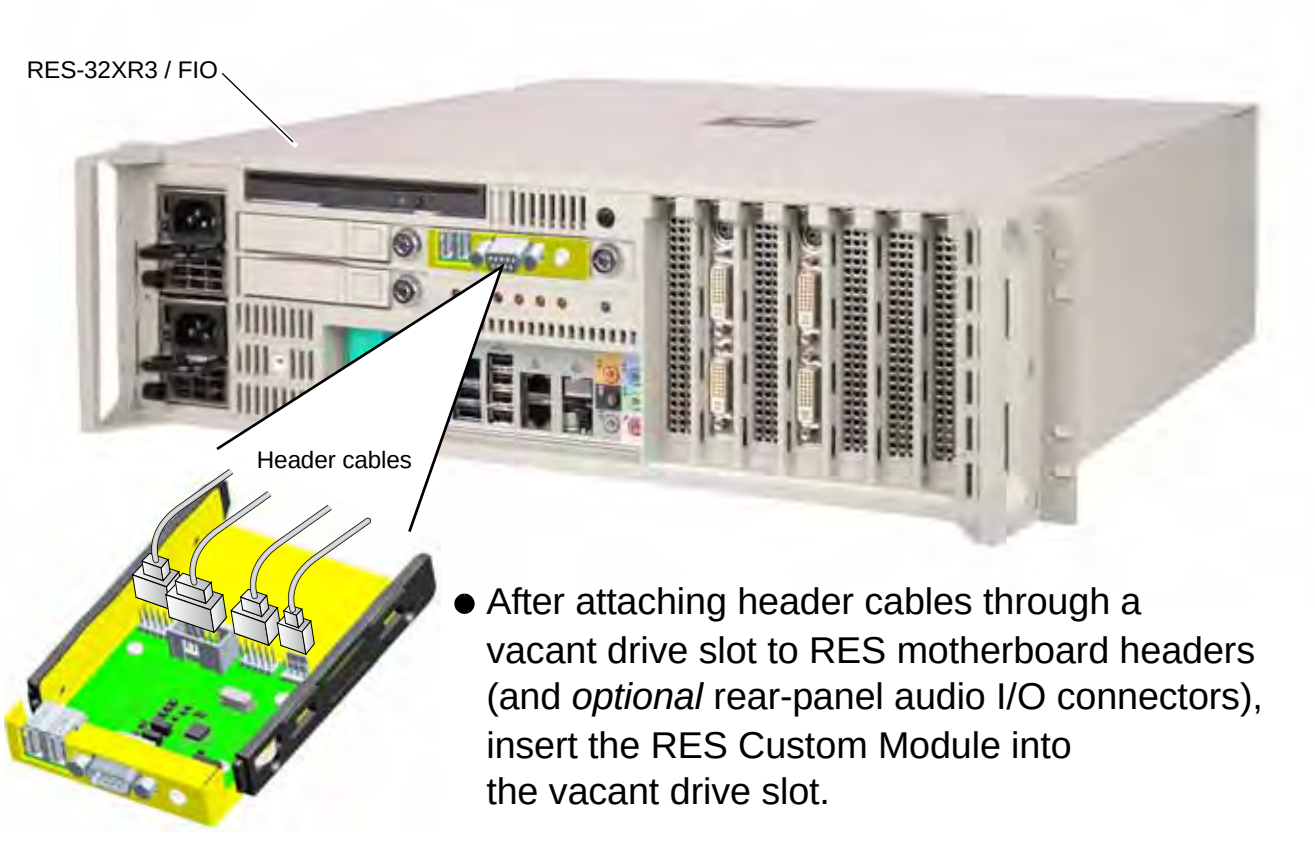

RES-32XR3 / FIO
Header cables
RES Audio/USB/Serial Port Custom Module
● After attaching header cables through a vacant drive slot to RES motherboard headers (and *optional* rear-panel audio I/O connectors), insert the RES Custom Module into the vacant drive slot.

Figure E-2. Install the RES Audio/USB/Serial Port Custom Module

E.1.1 Attach I/O Cables

Figure E-3 shows the three types of I/O supported by the RES Audio/USB/Serial Port Custom Module:

- USB Port A and Port B
- One Serial Port
- One *optional* Stereo Audio Jack (installed only by customer request)

Figure E-3 also shows the header connectors that are routed by cable through the empty drive slot into the RES system for connection to the proper RES motherboard surface headers or *optional* rear audio connectors.

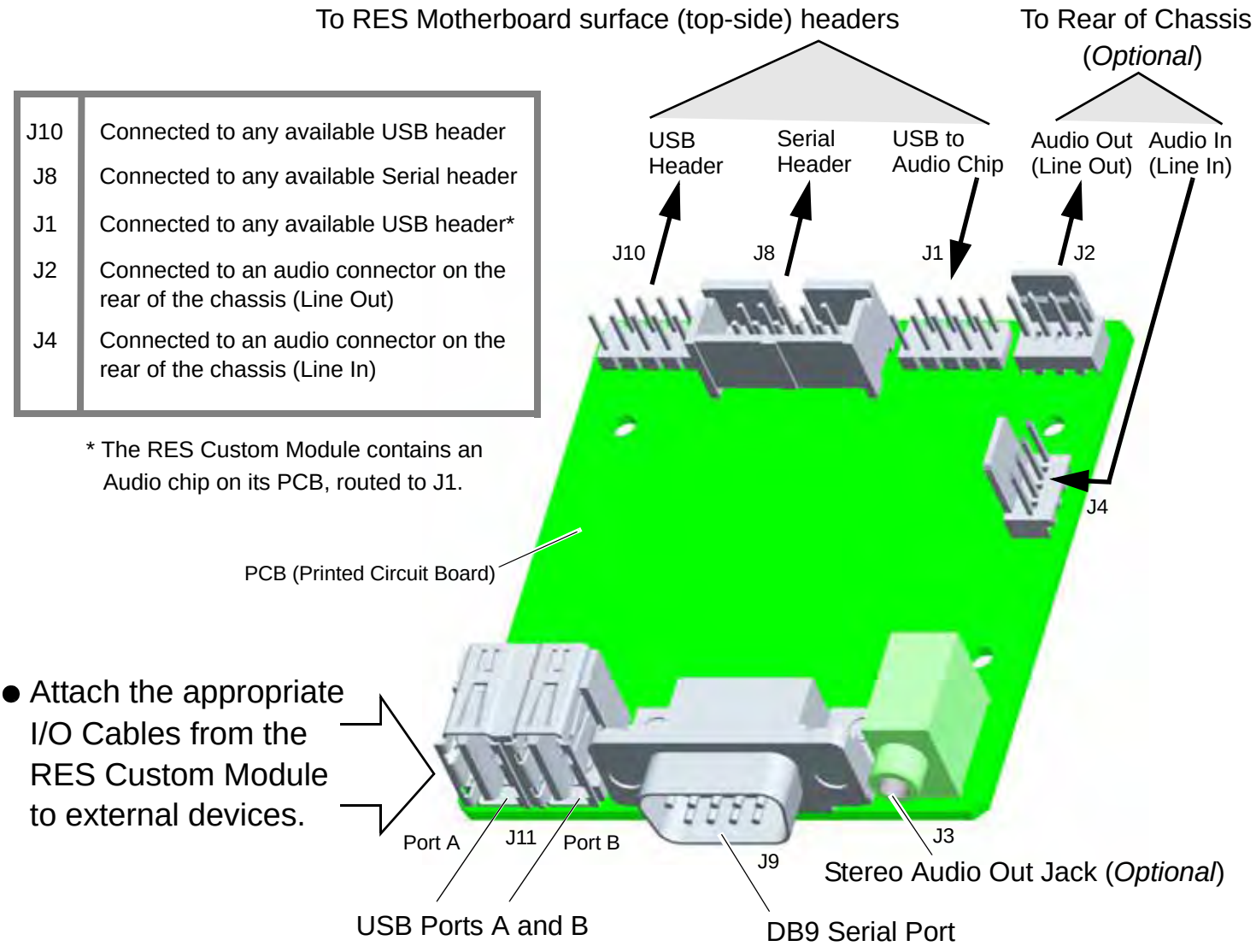

To RES Motherboard surface (top-side) headers
To Rear of Chassis (*Optional*)
J10 Connected to any available USB header
J8 Connected to any available Serial header
J1 Connected to any available USB header*
J2 Connected to an audio connector on the rear of the chassis (Line Out)
J4 Connected to an audio connector on the rear of the chassis (Line In)
* The RES Custom Module contains an Audio chip on its PCB, routed to J1.
USB Header
Serial Header
USB to Audio Chip
Audio Out (Line Out)
Audio In (Line In)
J10
J8
J1
J2
J4
PCB (Printed Circuit Board)
● Attach the appropriate I/O Cables from the RES Custom Module to external devices.
Port A
J11
Port B
J9
J3
Stereo Audio Out Jack (*Optional*)
USB Ports A and B
DB9 Serial Port

Figure E-3. Attach the Appropriate I/O Cables

If the RES Audio/USB/Serial Port Custom Module is removed from its drive slot, it is recommended that the end of the motherboard I/O cable attached to the Module header be appropriately tagged so that it can be correctly reconnected when the Module is reinstalled. If the I/O cable is removed from its motherboard header, it should also be appropriately tagged for proper reconnection at a later time.

E.1.2 Connector Pinouts

E.1.2.1 USB Ports A and B

The RES Audio/USB/Serial Port Custom Module supports two USB (Universal Serial Bus) port connectors (see *Figure E-4* for pinouts), USB A and USB B, on the front I/O panel.

USB pinout descriptions are listed in *Figure E-4*; pinout signal descriptions are described in *Table E-1*.

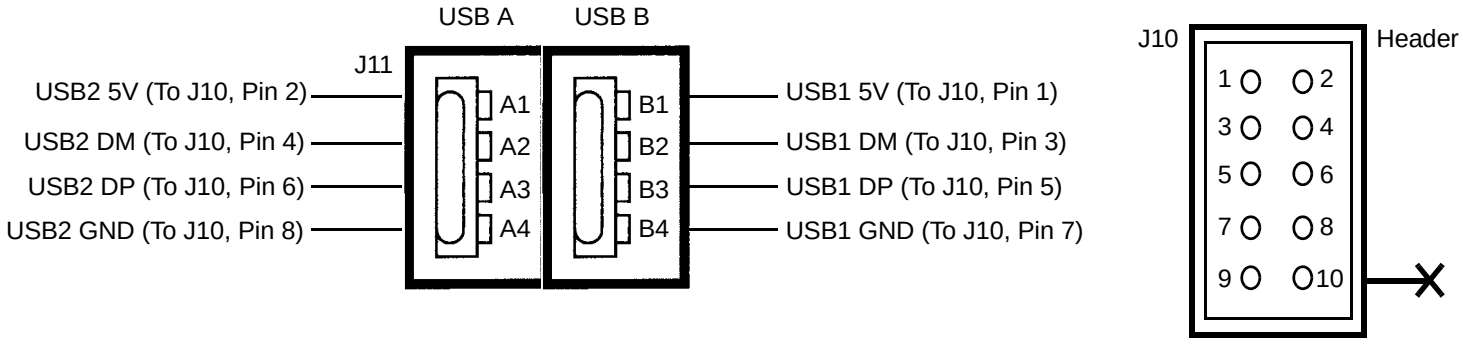


Figure E-4. Dual USB Connector Pinouts

Table E-1. Dual USB Connector Pinout Signal Descriptions (J10)

Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	DM (Data Minus)	4	DM (Data Minus)
5	DP (Data Plus)	6	DP (Data Plus)
7	Ground	8	Ground
9	*Cut Off for Keying*	10	*No Connection*

E.1.2.2 Serial Port COM1

The RES Custom Module supports one **male** DB9 serial port connector (J9) on the front I/O panel (see *Figure E-5*)—COM1.

The COM1 pinout is listed in *Figure E-5*; pinout signal descriptions are described in *Table E-2*, which also shows the serial header (J8) connections to serial port J9.

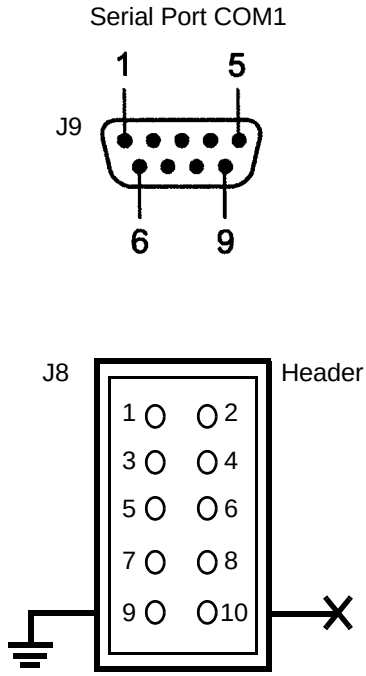


Figure E-5. COM1 Serial Connector Pinout

Table E-2. COM1 Serial Connector Pinout Signal Descriptions (J8 and J9)

J8 Pin	Signal Name	Connected to J9 Pin	J8 Pin	Signal Name	Connected to J9 Pin	J8 Pin	Signal Name	Connected to J9 Pin
1	DCD	1	4	RTS	7	7	DTR	4
2	DSR	6	5	TXD	3	8	RI	9
3	RXD	2	6	CTS	8	9	GND	5

E.1.2.3 Stereo Audio Ports (*Optional*)

The RES Custom Module supports one *optional* Stereo Audio Out jack on the front I/O panel (see *Figure E-6*).

The Stereo Audio Out pinout is listed in *Figure E-6*; header J1 pinout signal descriptions are described in *Table E-3*.

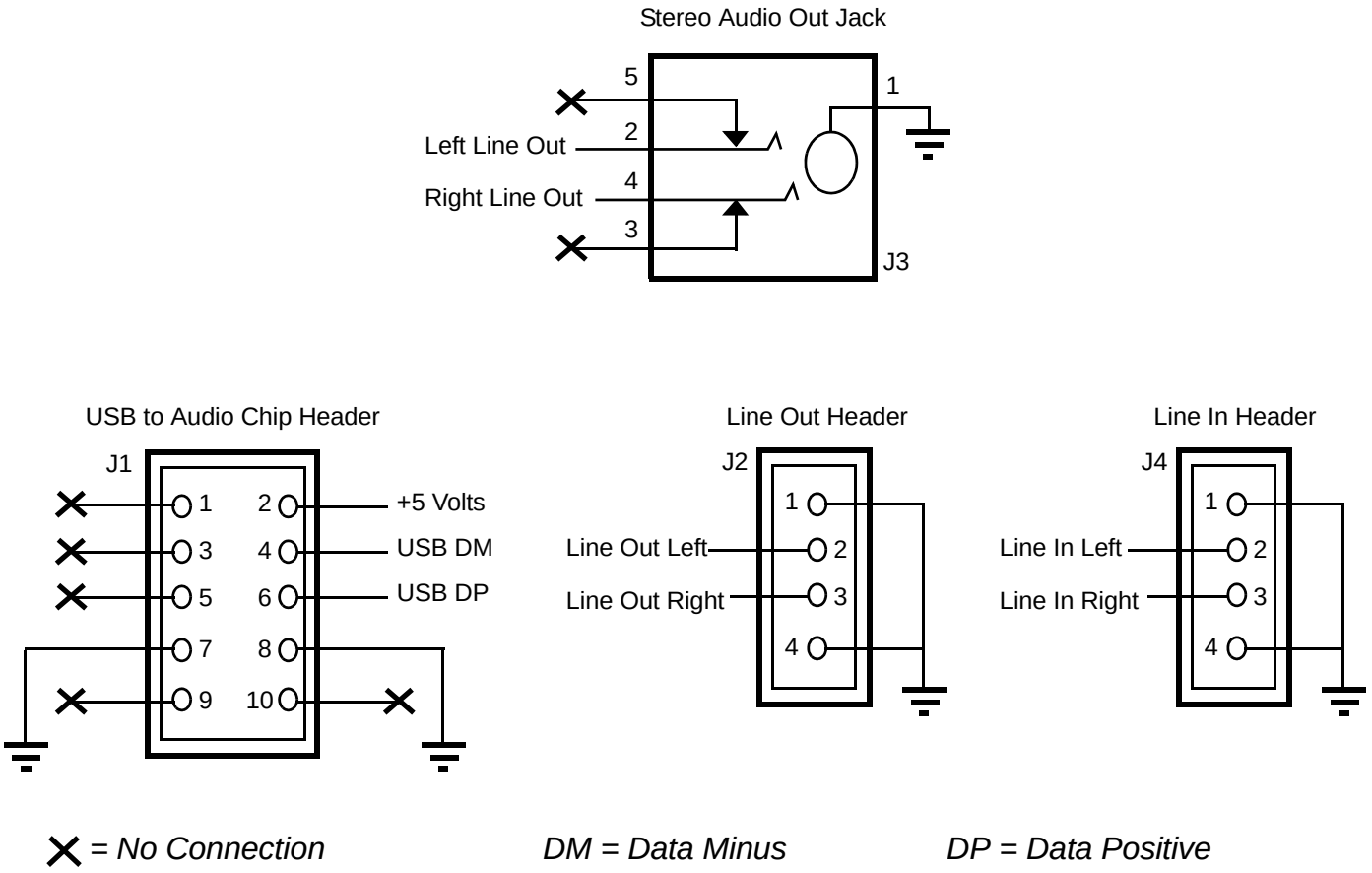


Figure E-6. Stereo Audio Connector Pinout

Table E-3. Stereo Audio Out Connector Pinout Signal Descriptions (J1)

Pin	Signal Name
1	*No Connection*
2	+ 5 volts
3	*No Connection*

Pin	Signal Name
4	Data Minus
5	*No Connection*
6	Data Plus

Pin	Signal Name
7	Ground
8	Ground
9	*No Connection*

E.2 Ordering the RES Audio/USB/Serial Port Custom Module

Because internal modifications must be made to the RES chassis in order to support the RES Audio/USB/Serial Port Custom Module, the Custom Module must be specified on the purchase order for your RES system. Please contact Themis for further information regarding the RES Audio/USB/Serial Port Custom Module. You can reach Themis on the web at www.themis.com, or by calling +1 510.252.0870.

Appendix F

Re-packaging Instructions

F.1 Re-packaging for Shipment

If it becomes necessary to return equipment to Themis Computer, it is very important that the equipment be shipped in the original packaging which provides adequate protection against crushing and moisture invasion. Failure to use original packaging materials, exactly as described in this appendix **may invalidate the warranty**. If the original packaging is no longer serviceable, or no longer available, please contact Themis Customer Support for a new shipping box to send back your RES-21XR3 ensuring protection from damage in transit. If it becomes necessary to ship in packaging other than that provided by Themis, equipment should be wrapped in a moisture resistant covering and placed either in double boxes, or in boxes with crush resistant insulation between the equipment and the outer walls of the container. When using the original packaging, the clear plastic membrane should be placed next to the equipment; i.e., up against the bottom, or down against the top. The following instructions assume the original packing components are still available, and in serviceable condition.

Caution: Failure to use the original Themis packaging materials, and failure to follow the instructions of this Appendix F, **may invalidate the warranty**. Please contact Themis if new packaging materials are required.

F.2 Packaging Components

The original packaging components are shown in *Figure F-1*, page F-2. They comprise a packaging box, bottom crush-resistant layer, and top crush-resistant layer. The bottom and top crush-resistant layers are identical components, placed so that the side with the plastic membrane is against the equipment.

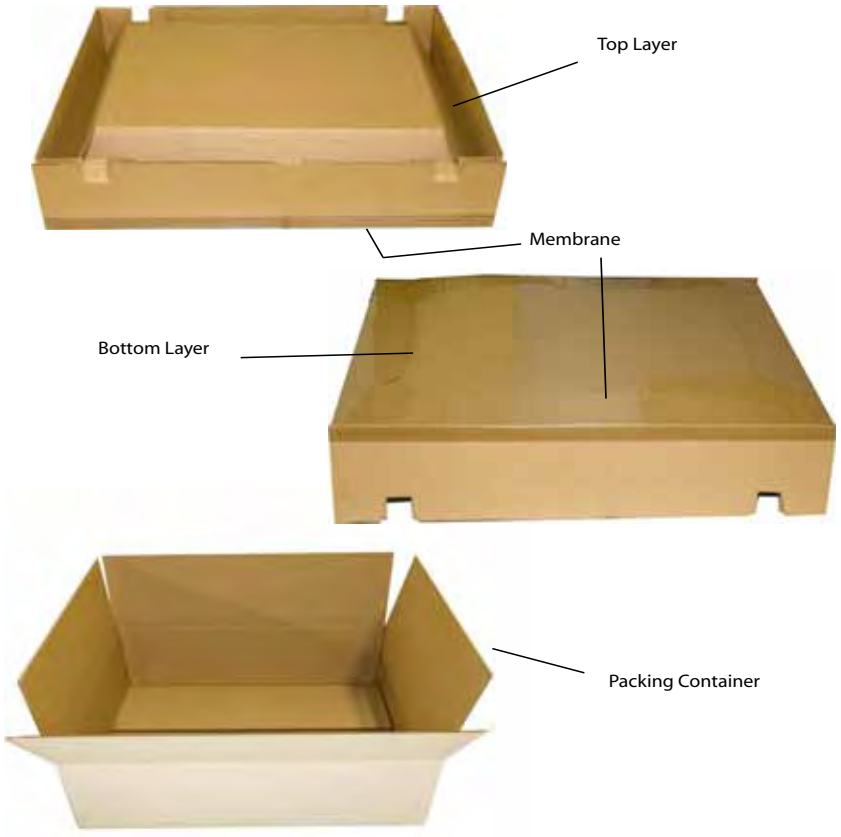


Figure F-1. Packaging Components

F.3 Instructions for Re-packaging

Reassemble the packaging material about the equipment in accordance with the following instructions (see *Table F-2* on page F-3):

- Inspect the original packaging materials for serviceability.
- Place one crush-resistant layer open side down, membrane side up, in the bottom of the box.
- Place the equipment on top of the bottom layer, right side up.
- Place the other crush-resistant layer, membrane side down, open side up, on top of the equipment.
- Press down on the top layer to firmly compress the layers around the equipment, and allow for the box flaps to be closed.
- Seal the top of the box with strong packaging tape, wrapping the tape completely around the box, both lengthwise, and crosswise.
- Prepare for shipment in accordance with the instructions received from Themis Computer.

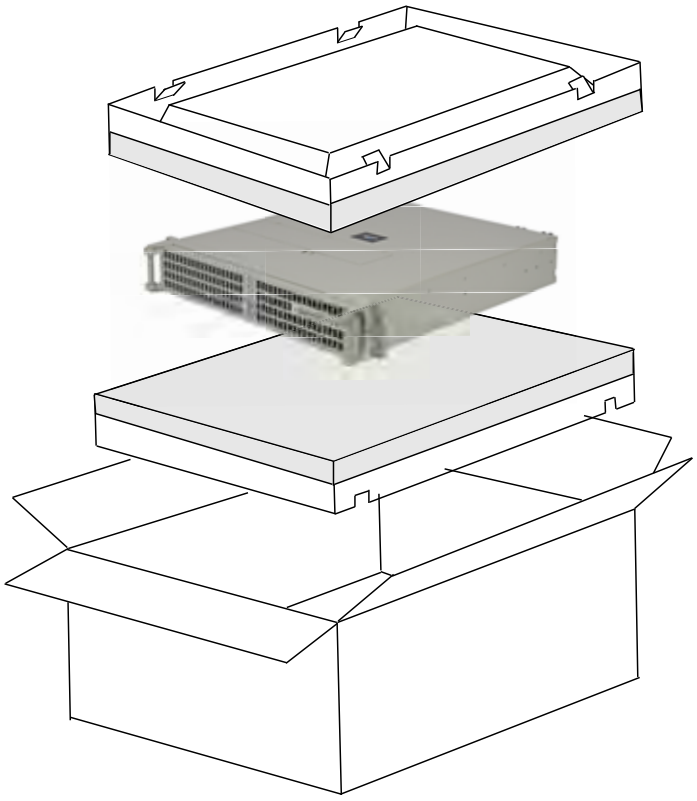


Figure F-2. Order of Assembly

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